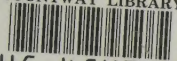


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HIGHER MEDICAL EDUCATION,

THE TRUE INTEREST OF THE PUBLIC

AND

OF THE PROFESSION.

TWO ADDRESSES DELIVERED BEFORE THE MEDICAL
DEPARTMENT OF THE UNIVERSITY OF PENN-
SYLVANIA ON OCTOBER 1, 1877, AND
OCTOBER 2, 1893.

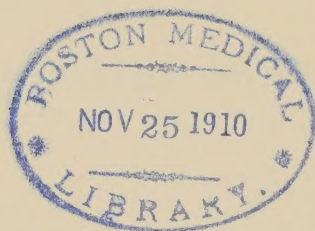
BY

WILLIAM PEPPER, M.D., LL.D.

PHILADELPHIA :

J. B. LIPPINCOTT COMPANY.

1894.



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PREFACE.

THE first of these Addresses was delivered at the opening of the one hundred and twelfth course of lectures in the Medical Department of the University of Pennsylvania. As extensive and radical changes had been made in the plan of medical teaching in that school, it seemed proper that a full statement should be given of the reasons for such reforms. An attempt was made, therefore, to present fairly the then position of medical teaching in America, to point out its chief defects, and to indicate the causes that had led to them, and the evils to which they in turn gave rise.

The second Address was delivered sixteen years later, in October, 1893, at the opening of the Four Years' Course of Medical Study. It is hoped it may serve to indicate the advances effected in the interval, and also the lines along which further progress should be made.

In order to enable the accuracy of the statements in these Addresses to be tested, as well as to afford information which may be of value to those specially interested in this subject, brief synopses of the state of medical education in various countries in 1877 and in 1893 have been prepared. These are given in three Appendices. The first (No. I., pp. 44-59) is that originally compiled for the address of 1877. It was based upon data secured in response to a series of questions forwarded through the Department of State at Washington to the proper officials in the respective countries. The second and third (pp. 77-99) have in like manner been obtained from the highly interesting communications received in response to a recent series of questions forwarded

in like manner. I beg to acknowledge my great indebtedness to the distinguished officials of that Department for their courteous assistance on both occasions. I am also indebted to many kind friends in America, as well as in almost all of the countries referred to, for valuable information furnished in reply to my personal inquiries.

It is impossible to avoid an expression of thankfulness for the good work already accomplished in the elevation of Medical Education in America. In spite of the grave defects that still exist, there is ample ground for confident hope that the future is full of honorable progress.

WILLIAM PEPPER.

Philadelphia, 1894.



ADDRESS

DELIVERED

OCTOBER 1, 1877.

THE choice of a subject for an address, such as I have to-day the honor of delivering before you, is usually a matter of no little difficulty. For many years the course of medical education in this country has been smooth and uniform. Few new features have been introduced, still fewer important changes or improvements have even been suggested. The profession and the public have become familiar with the routine pursued, and the orator, on such an occasion as the present, has had neither opportunity nor temptation to quit the pleasant if somewhat o'er-trodden path of eulogizing medical science, and the life and work and rewards of the physician. It is true that to those of you who are now entering for the first time on a course of medical study, there are practical questions of importance and interest concerning the best methods of study and the disposition of your time which might be profitably considered. But many of my predecessors upon whom has devolved the duty I must now discharge, have discussed these questions with such thoroughness and ability as leaves little to be added.

But a few months have passed since the close of the Centennial year of our national existence. A year ago there were gathered in this city, the cradle of our nation's birth, the chosen representatives of almost every country on the globe. The occasion was one of singular interest. In vast halls, whose size and beauty made it seem that they had sprung into existence at the bidding of some magic power, were collected for study and comparison the choicest products of every soil and clime, the most finished works of art, and the most perfect specimens of mechanical skill from every country, in a word, the evidences by which could be determined the

growth and present position of each nation in all that serves to enrich, to embellish, to strengthen, and to advance civilization.

We had sought the test, and it was a searching one. The older members of the great family of nations did not despise the friendly challenge we had proffered; the fame of our enterprise and achievements had gone abroad; and the most ancient, the most powerful, the most highly polished and artistic people sent their finest works to stand side by side with those of the young western Republic. It is not too soon to learn the verdict that has been pronounced by the competent and impartial Judges chosen for this purpose from the most expert of each nation. Has it not stamped, with marks of strongest approbation, the achievements of our country in almost every branch of human industry? Has it not registered the fact that in the brief space of a century we have taken such vast strides in material development, that in many things we approach the older nations, and that in many we equal or even excel them? No true American can reflect upon this verdict without a feeling of honest pride, not only for what has actually been accomplished, but for the evidences given of the existence among us of qualities that will surely lead to far greater and higher achievements.

But I do not allude to this subject to-day merely to indulge in complacent self-laudation, but rather to ask your attention to those points in which the exhibit of our country's progress and present position was not of so gratifying a character. Our vast railway system, our mills, our factories, our machinery—everything that requires skill and business enterprise and mechanical ingenuity, and that contributes directly to material prosperity—elicited world-wide applause. But not these alone came under searching inspection; and it would be well for us if in those things which require other and even higher qualities we had been adjudged to have done as well. It is not that in all of these matters, such as municipal organization and government; the administration of poor laws; the encouragement of art and science; the system of technical and professional education, our defects are equally glaring. But surely candor compels us to acknowledge that in regard to many such subjects, which are essential to a lasting and elevated civilization, we are still far behind-hand. As if in bitter irony, the great exhibition of our enormous progress in material prosperity coincided with a period of unprecedented depression of all business and commercial interests, and with the appearance of evils in our municipal and national affairs that seemed to threaten the very existence of our government. At no time in the history of a great nation was

it ever more clearly shown than it now is among us, that for the advancement of true and enduring prosperity more, much more, is needed than inexhaustible natural resources, prodigious business enterprise, and extraordinary mechanical ingenuity. We are now realizing the supreme importance of sound principles of political economy; of habits of moderate and correct thought on matters public and private; of purity and fidelity in the discharge of official duties; of careful and comprehensive study of all those conditions which affect the physical and moral well-being of our vast and rapidly growing communities. Amid the confusion and distrust which so generally prevail, one common thought must be entertained by most intelligent people, which is that, among the influences that have led to the present state of affairs, one of the most powerful has been the want of thorough special training and preparation on the part of those to whom important duties are entrusted. The total absence of any civil service system, the self-complacent readiness with which the most important and complicated functions of government are assumed by persons utterly without training or preparation for the work, are but the most notable instances of a spirit of reckless disregard of all the sound principles of education that displays itself more or less prominently in every profession and in every trade.

I suppose that few persons who are at all familiar with the subject would be willing to express even the smallest satisfaction with the present state of the medical profession in this country. It is true that for the past four years all branches of industry have been depressed, but the troubles that affect the medical profession have been steadily advancing and increasing for at least fifty years. Its ranks are overstocked to an unparalleled extent; there is, I believe, no other business in which so small a proportion of those engaged earn a living; it finds successful rivals among the practitioners of such exclusive schools as Homœopathy, Eclecticism, and the like; and, worst of all, it has failed to elevate its standing and repute with the public, or to exert that powerful influence upon sanitary legislation, upon public and private hygiene, upon education, and upon similar subjects which is at once its duty and its highest prerogative. I shall have occasion to adduce facts and statistics in support of some of the above statements, but I would not be understood as implying—what seems the intent of many addresses to medical classes—that the privilege of devoting himself to the welfare of humanity, to the service of the public, and to the advancement of medical science, should be the one and all-sufficing reward

of the physician; while the questions of making and laying up money, or even of earning a decent support for his family are regarded as too sordid to be mentioned. It is useless to gloss over the palpable fact that the medical profession, to be on the whole successfully maintained, must be based and conducted on ordinary sound business principles. True, no pursuit calls for a larger display of the best qualities of human nature than does the practice of medicine, and I believe it will be conceded that the profession meets this demand fairly well. But the obvious motive which actuates most men who study and practice medicine is not an overpowering spirit of benevolence, but a desire to earn an honest livelihood. Hence it is but natural that they should regard the requirements, of whatever kind, that may be imposed on the medical student or the physician, not only in relation to a standard of ideal perfection, but also as they affect their own interests. But none the less is it true that, owing to the peculiar and complicated relations they hold to society, one of the most essential elements of success among medical men is the maintenance, on the part of the profession, of a reputation for high personal acquirements and qualifications, and for accurate knowledge of and public-spirited interest in all subjects pertaining to sanitary science. With the rapid decay in superstition, and in veneration for the mysterious, the feeling with which medical science and medical men are regarded has undergone an equal change. Not only has the feeling passed away which invested the physician with almost supernatural powers, and which gave to a dose of physic the character of a fetish, but there has been a weakening of the old blind dependence upon mere title or upon mere personal or school authority. On the other hand, the vast improvements that have taken place in medical science; the great additions to the positive knowledge of disease and of the means for its prevention and cure; the widespread interest among the community concerning all physical science; the prevailing sense of the supreme importance of private and public hygiene; the constantly increasing wear and tear of our complicated social life—all of these foretell the large part which our profession must play in the future, and at the same time attest its power. It seems likely indeed, as has been said by one of the greatest living orators*—that the influence of the medical profession, great as it now is, is destined to grow in greater proportion than that of other

* Gladstone's Address at the London College, July 13, 1876; *Med. Times and Gaz.*, July 22, 1876.

professions. But in order that this may come true it is essential for medical men to be thoroughly educated and fitted for their work—and I repeat what I have said, and what I well know will be endorsed by every one competent and disinterested, that in America this is far from being the case, and that the position of the medical profession here is very far from being satisfactory.

I know that it will be promptly said that I am arguing on a false basis, and endeavoring to erect a standard of excellence too high for the requirements of this country. It will be urged that the present state of the profession and the system of teaching that has led to it are natural and proper at the stage of development we have reached; and that in considering what improvements might be desirable, common business principles and the results of experience must not be lost sight of.

I know that the names of many American physicians and surgeons who, either by their brilliant achievements, or by their learned writings, have won world-wide fame, will be advanced in proof that a system of teaching capable of producing such illustrious men cannot be very defective.

Let us then proceed to a careful and impartial examination of the various questions we have thus raised. Let us not be satisfied, on the one hand, with stereotyped eulogies of a system simply because it has lasted many years and has produced a certain measure of good results; nor, on the other, let us fall into the error of decrying it as wholly bad merely because it differs widely from the methods adopted in other lands. That which is essential for us to learn is whether the plan of medical education usually pursued in this country is really the best adapted to its wants, and the best for the interests at once of the community and of the medical profession itself. It is true that a considerable number of distinguished men have been produced under this system; it is true that, when in 1861 a terrible civil war broke out in our land, a number of able medical men were forthcoming who organized a most efficient system of medical service, although it was perfected slowly and at enormous cost; but these facts, while they show clearly that we have among us many men of scientific ability and capacity equal to any in other countries, that many of these are to be found in the ranks of the medical profession as well as elsewhere, and that with such spirits no defects of education can prevent the subsequent development of talents nor the acquisition of knowledge, have little or no bearing upon the broader question we have above proposed.

The University of Pennsylvania enjoys the honor of having first established a medical school on this continent. In the year 1765, when the population of Philadelphia was only 25,000, and that of the colonies in the aggregate less than 2,500,000, and when too they had just emerged from a long and cruel war, the fame and prosperity of this institution were already so great that nearly 400 students were receiving their education in its various departments. It was at this time that its Board of Trustees, encouraged by strong recommendations from the Proprietary of Pennsylvania and from eminent physicians abroad, established the Medical Department of the University of Pennsylvania.

The plan of its organization was inspired by the two individuals first chosen to fill the position of professors, Dr. John Morgan and Dr. William Shippen, Jr., and as they and several of their colleagues had been educated at the University of Edinburgh, it was but natural that the system of education adopted in the new institution should be closely moulded upon that of its illustrious prototype. It was no idle boast on the part of the Trustees that "their scheme of medical education was to have as extensive and liberal a plan as in the most respectable European seminaries, and that the utmost provision was made for rendering a degree a real mark of Honor, the reward only of distinguished learning and abilities."* I ask you to note with particular attention the requirements and qualifications which were attached to the medical degree at that early day when medical science was comparatively undeveloped, and when our country had not yet passed the perils of feeble, struggling infancy. It was enacted (*loc. cit.*) "that all such students as have not taken a Degree in any College shall, before admission to a degree in Physic, satisfy the Trustees and Professors of the College concerning their knowledge in the Latin tongue, and in such branches of Mathematics, Natural and Experimental Philosophy as shall be judged requisite to a medical education." Two grades of degrees in medicine were established. For the lower of these, that of Bachelor of Medicine, the student was required to serve a sufficient apprenticeship with some reputable physician; to have a general knowledge in pharmacy; to attend at least one complete course of lectures, and to follow the practice of a general hospital for one year. After having shown his fitness at a private examination, he was then admitted to a public examination for the bachelor's degree. To obtain the degree of

* Announcement in Pennsylvania Gazette, July 27, 1767.

Doctor of Medicine it was necessary that the applicant should have been a Bachelor of Medicine for at least three years, should have attained the age of twenty-four years, and should write and defend a thesis publicly in the college.*

To appreciate fully the elevated standard thus erected, we must consider not only the condition of our colonies, but, even more, the state of medical science. The application of the methods of exact physical research, destined to effect a complete revolution in medical science, had not begun. Chemistry was in its infancy, for Lavoisier's great work was not published till 1773; physiology, as we understand the term, was all but unknown; normal anatomy, awaiting the discoveries of Bichat in 1800, was limited to the description of the coarser features of the different organs, while only the first rude sketches had been traced of the grand science of pathology and morbid anatomy. Turning to more practical subjects, we find the science of obstetrics, which was slowly freeing itself from prejudice and contempt, in so elementary a state that it was not until 1756 that it was introduced by the efforts of Thomas Young among the studies of the University of Edinburgh, while in the University of Pennsylvania it continued until 1810 to be regarded as a mere appendage to the subject of anatomy, and was taught by the professor of that chair. In the theory and practice of medicine and of surgery, the weight of personal authority, supported by eloquence and genius, but with scant basis of positive and accurately observed facts, was paramount. Correct diagnosis was impossible, for Auenbrugger (1761) was unheeded, and Laennec was yet unborn: and the crudest speculations filled the place of our enlightened pathology, although gleams of the coming brightness may be found in the works of Boërhaave, of Cullen, and of Rush.

In every department the limits of accurate knowledge seem to us strangely restricted, and the labors of future investigators had yet to found many essential branches of medicine and surgery, such as diseases of women and children, of the eye and of the ear; the chemistry of the urine; the use of electricity in nervous diseases; physical diagnosis, and others, all of which constitute to-day an integral and indispensable part of our system of medical education. It will be observed also that clinical teaching was inaugurated in 1760 in the Pennsylvania Hospital, and in 1770 in the Philadelphia Almshouse, now the Philadelphia Hospital, and that attendance

* Unless he should be beyond seas, or so remote on the Continent of America as not to be able to attend without manifest inconvenience.

upon this practical instruction was obligatory and continued to be so for many years, until 1845. This is not the time to dwell on the rapid development that has taken place during the last century in every branch of medical science; but you will not fail to perceive that the requirements for the degree in medicine established by the trustees of the first medical school in America in the year 1765, were such as to insure on the part of every graduate a full and sufficient knowledge of the science and art of medicine as it then existed.

I have been thus particular in detailing the mode of origin of the Medical Department of the University of Pennsylvania, because it proved to be the fruitful mother of a numerous offspring of medical schools which were established in different portions of the country. In all of these we shall find the features of the original more or less reproduced; and at all later stages of the development of the system of medical education in America the University of Pennsylvania has seemed to serve as the standard and exemplar. At every period during the last century we find a willing consideration and respect paid to her position and example, which were accorded to her not only as the oldest and most venerable, but on account of the talents and accomplishments of the long line of illustrious teachers who have ever kept her the most prominent and famous among American medical schools. Such a position and influence involve grave responsibilities. They call for incessant efforts on the part of such a school to keep abreast of the progress of science and knowledge, to improve its methods and advance its standard of requirements so that its graduates may always fairly represent the best and wisest and most useful culture of the day. It was by the adoption of such a standard and such methods that the Medical Department of the University of Pennsylvania speedily acquired a world-wide reputation, and if subsequently this fame, as well as that of all of her imitators, has fallen lower and lower in the estimation of the world, you may rely upon it that this unhappy result has come from no lack of ability or of public-spirited devotion on the part either of the Trustees or of the Faculty of this institution, but from certain radical defects in the organization and system of our medical schools, which, instead of being corrected with the progress of time, have grown more and more fixed and flagrant. If we would learn the truth and know the estimation in which our medical education has of late been held by all other countries, it needs only to examine the changes which have taken place in their system of medical teaching proportionate to

the vast advances in medical knowledge, and then to turn to the picture of our own position as drawn by those most competent to depict it.

In every country but ours, without, so far as I know, a single exception, where a system of medical education can be said to exist, certain general principles will be found embodied in that system. (See Appendix I., Table IV.)

In the first place, the applicant before being allowed to matriculate as a student of medicine must, unless he has a degree from some literary college or analogous institution, pass a preliminary examination. A certain amount of general education and certain habits of study should always precede the higher and special training. But this preliminary examination by no means requires a previous collegiate course, as it usually involves only such attainments as a moderate knowledge of Latin and Greek, for which in some cases German and French may be substituted, and of grammar and composition, of arithmetic and algebra, and, in some cases, of the elements of physics or natural philosophy.

In the second place, the student is required to devote about nine months a year for four, five, six, or even seven years to his technical education before he is eligible for examination for the degree in medicine. The studies during this time are carefully graded, the first part of the course being devoted to chemistry, botany, and such other branches of the natural sciences as are fundamental to the science proper of medicine, after which anatomy and physiology, which treat of healthy structure and healthy functions, are taken up, to be followed by the study of pathology and of morbid anatomy, and later still, of the theory and practice of medicine, surgery, and obstetrics, together with that of the chief specialties. Nor is this instruction only didactic and theoretical in character, for the student is required to do practical work in the laboratories of histology, anatomy, chemistry, and pharmacy, while his personal training in medicine and surgery is conducted at the bedside in the hospital ward.

In the third place, the student is required to pass partial examinations at certain intervals, to determine his fitness to advance from one class to the next; and at the close of his studies his examination for the degree is conducted with strict impartiality by men who have no interest either in rejecting or admitting him to practice.

It will be seen, from this hasty summary, that the general principles recognized as essential and embodied in all systems of

medical education but our own are: 1. An examination preliminary to matriculation; 2. A sufficient length of time devoted to medical studies; 3. Careful personal training of each student in all practical and clinical branches; 4. Careful grading of the course; 5. Impartial examinations by disinterested individuals.

In many countries the above course, if terminated by a successful examination, entitles the graduate to the degree of Bachelor or Licentiate in Medicine, with the privilege of practicing his profession; while the degree of Doctor in Medicine is reserved as a mark of honorary distinction for those who, having held the lower degree for several years (three to five), choose to pursue certain advanced courses of study in philosophy, history of medicine, etc., and to stand an additional examination.

I am aware that there are some in this country who will cry out at once that so prolonged and elaborate a course of study is not necessary in America to produce good practical doctors, but that it can only tend to develop a class of over-educated, supercilious, unpractical medical men, too good and fine for the average work of the physician, and while very learned about philosophy, dynamics, and protoplasm, none the better able to order a potion or a clyster, to set a fracture, or to cut off a leg. No frame of mind is more enjoyable than the self-complacent contentment of the optimist who holds the candle of his own excellences so close to his eye that it dazzles him, and makes him blind to the broad sunlight of truth and progress flooding the world. Such objections as the above might be expected, if the elevated system of teaching which I have sketched were adopted only in one or two very old and wealthy countries, for it might then seem to be due to a highly artificial state of society; or if, on the other hand, it were found only in such a country as Germany, because it is the habit of those whose ignorance of her literature prevents them from appreciating her unrivalled achievements both in the science and art of medicine, to say that everything is there directed to mere scholastic and philosophic excellence without regard to practical success or to the requirements of daily life. But when we see that not only in older and more highly civilized and more densely populated countries, such as England, France, and Germany; but in those whose state of civilization and the condition of whose people we should be slow to regard as favorable compared with our own, such as Russia and Spain; in those, such as Brazil and Australia, whose forms of government and social system are younger even than our own; and, finally, even in countries which, like Mexico and the republics

of South America, we are disposed to regard as only semi-civilized, and where the instability of government and the frequent convulsions of social order would seem to render any fixed and comprehensive educational policy impossible—when we see that in each and all of these a thorough plan of medical education is held essential for the welfare of the community, for the development of medical science, and for the interests of the medical profession itself, it is surely time to consider carefully if we are not sadly at fault in this; and if, while elsewhere the requirements of medical education have been made to keep pace with the growth of medical knowledge, with us they have not been controlled by other and far less proper influences.

Nor if we consider the present state of medical science, and note the vast advances which have been made during the past century in all of its departments; if we reflect upon the enormous extent of accurate information, of minute technical knowledge, and of special practical training which is now required to fit a man to practice medicine scientifically, and to render to those sufferers who seek his help the full measure of the benefits which the healing art is now capable of bestowing, shall we be surprised at the careful and prolonged course of study that we find is imposed in all countries but our own upon the applicant for the degree in medicine. Surely no one can fail to appreciate the enormous importance of having a sufficient supply of thoroughly trained and skilful physicians. When overtaken by serious accident or illness, all other means of relief fail, and the most wealthy, the most powerful, the most illustrious must, like the poor and unknown, cast their dependence upon the skill which, under God's guidance, the physician shall display in battling with the dread angel of death, whose wings hover near at hand. No other study presents difficulties and complexities so great as those which beset the study of medicine; in no other occupation in life are such varied culture of the mind and training of the senses demanded. Yet I learn on inquiry that the average time of apprenticeship to the following trades or callings is for barbers, three years; for carpenters, printers, turners, plumbers, pattern-makers, at least four years; for machinists, five years; for pilots, seven years.

Can it be that the apprentice must practice five years before he is regarded as a skilled workman, fitted to mend or make rude machines of iron or brass, and that in this land of intelligence and common sense one who has studied medicine less than one-third that time may have his licence to meddle with and make or mar

that most wonderful machine—man's body—infinately complex, gifted with boundless capacities, and freighted with the awful responsibility of an immortal soul? Can it be that seven long years of pupilage must pass ere the young pilot may be trusted in charge of a vessel to guide it through the crooked narrow channel, where only the hidden dangers of sunken rocks or treacherous shoals beset him, while in less than one-fourth of that time we profess that one may qualify himself to pilot that most precious craft—a human life—through the long, dark, intricate windings of disease, where at every turn death lies concealed, so close at hand and so difficult to avoid that nothing but the most consummate skill can insure safety? A strange-seeming contrast, and yet the following careful examination of the state of medical education as it exists in all the medical schools on this continent, with a few honorable exceptions, fully supports the paradox.

1. In the first place, no examination whatever is required preliminary to matriculation. It is important that correct ideas should be held as to the intent and value of such an examination. It is by no means designed to restrict the study of medicine to those who are fortunate enough to have enjoyed a collegiate education. But as it is necessary to compress the purely technical studies into as short a period as possible, and as certain habits of application and a certain amount of general education are requisite to enable the student to pursue to the best advantage the studies of the medical school, it is in the highest degree important that he, unless already a graduate of a literary college, should be expected to pass a preliminary examination on the elementary branches of a general education. The absence of such a preliminary examination in our system is therefore a grave defect, and one which operates as much against the interest of the student himself as it does against the average qualifications of the profession. I regret to say that in the recent changes made in the curriculum of medical studies at this institution it was not deemed feasible to institute a preliminary examination at present; but it is clearly recognized that such an examination is essential, and it is the intention to establish it at the earliest possible date.

2. The period of study is utterly, nay, ridiculously, inadequate for the purpose. By the year 1811* the original requirements for

* Rules enacted by the Board of Trustees of the University of Pennsylvania, Jan. 21, 1811. See Carson's Hist. of Med. Dept. of Univ. of Pa., 1869, p. 117.

a degree in medicine in the University of Pennsylvania had been modified. The degree of Bachelor of Medicine had been abolished, and the following was the rule as to the degree of Doctor of Medicine: "No person shall be admitted as a candidate for the degree of Doctor in Medicine, until he shall have attained the age of 21 years, nor unless he shall have applied himself to the study of medicine three years, two of which shall have been in this University; nor unless he shall have attended the Pennsylvania Hospital during one session at least, and also have attended the practice and been the private pupil of some respectable practitioner." Already in the first forty-five years the baneful influences that we shall have to study had caused a lowering of the standard of education; but if we compare the requirements of 1811 with those of the present day, a still further fall is apparent.

In the announcements of most American colleges the above phraseology is still preserved as nearly as may be; but in reality the student is only *required to attend two courses of lectures, each of less than five months' duration* (115 to 122 days' actual teaching). No supervision whatever is maintained over the occupations of the students in the interval between the courses, and it is not to be wondered at that very many of them should either yield to the temptations of pleasure and ease, and pass these months in idleness, or else should be led by the actual need of money to pass them in some such occupation as school-teaching or harvesting, so that, as a matter of fact, the total length of time given by many, very many students, exclusively to their medical education previous to graduation does not exceed eight or nine solid months. It is true that, all the while, students are advised to study three years, and certain trifling inducements are held out; but since, as I shall show further on, the course of instruction is so arranged that they cannot gain much by so doing, only a small proportion will be found to thus voluntarily lengthen their term of studies. It is also true that, within a few years, courses of lectures during the spring months have been organized in connection with a few schools, to afford occupation for such ambitious students as actually themselves desire to receive more thorough and prolonged instruction than is regarded by the Faculties as sufficient to qualify them for the receipt of the honor of the Doctorate and for the practice of their profession. But as attendance on such instruction is not compulsory, and as no examinations are held upon the subject-matter of the lectures, it must be admitted that while it is well that such extra opportunities should exist for those who are anx-

ious to profit by them, they are not to be regarded as forming any essential part of the system of medical education, or as contributing to defend it from the grave charges of utter inadequacy which are brought against it.

In some schools the student is required to enter his name as a private pupil in the office of some respectable physician, but in too many instances this is a mere formality; the student paying a small fee for the privilege of calling the physician his preceptor, but receiving from him in turn none of the personal practical instruction which in olden times made this relation of preceptor and pupil really compensate in part for the want of a regular collegiate education.

3. In the next place, the lectures are exclusively didactic, certain branches being illustrated more or less copiously with experiments or models, according to the resources of the school and the ability of the teacher. Each annual course is, as a rule, the mere repetition of the preceding one. There is, of course, no means of enforcing attendance on these lectures, and the student who has paid for his ticket may attend few or many of them as he chooses, assuming the risk of cramming at the close, so as to be able to pass the final examination.

In the schools of the better class the student is obliged, or at least expected, to dissect each part of the human body, but apart from this, no practical work whatever is required of him. There is no laboratory-teaching in chemistry or pharmacy. The use of the microscope is not taught, nor is any opportunity afforded to become familiar with morbid anatomy. But far worse than this, the attendance on clinical teaching has now for a long time not been compulsory. In many of the towns which are honored as the seat of a so-called medical university, it is true that the population is so small that it were impossible for any hospital to exist of sufficient size to support any clinical instruction worthy of the name. But even in the larger cities, where there are ample clinical facilities, it is left altogether to the choice of the student, already overwhelmed and over-crammed with didactic lectures, whether or not he will attend a single clinical lecture during his entire course of studies. The mode of conducting this essential part of medical education is so superficial, moreover, that not even if a student sedulously avail himself of it can he really obtain much personal knowledge of practical medicine.

"Clinical" means "bedside," and clinical teaching, honestly and fairly so called, certainly means that the student shall be taken to

the bedside of the sick and injured, and there be himself taught the practical skill needed for the diagnosis and treatment of the disease. On the other hand, to use a fair illustration of the sort of clinical teaching which prevails, to bring a case of disease of the heart before a class of one, three, or five hundred students, to gravely place a stethoscope on the chest, listen attentively and announce that there are certain unhealthy sounds audible, and that, therefore, such and such a morbid condition exists, is a poor way of teaching those students to detect heart-disease themselves. It is the discovery of this wonderful means of diagnosis, auscultation, and of its associate, percussion, that has done more than anything else to make modern medicine what it is. There is scarcely any case of disease in which it is not important or even essential to make use of these means to determine fully the nature of the affection. Yet no opportunity is given to the student to practice them and become familiar with them. He is not required before graduation to show any proficiency in their use; and, in fact, the vast majority of American medical students receive the degree in medicine without ever having felt a sick man's pulse, or listened to the sounds of the lungs or heart. Many other illustrations might be given, drawn from the arts of medicine, surgery, or obstetrics, but they would only exemplify the same fact.

It is true that the enterprise of specialists and the growth of clinical facilities have led to the establishment of special courses of practical instruction in the spring months, or during the winter months, at such hours as will not interfere with the official instruction; but an extra fee is naturally attached to all such courses, and as it is not obligatory upon the student to take any of them, it is needless to say that a very small proportion of the class actually profits by these special advantages. Who could become a skilled musician merely by listening to elaborate expositions of the theory of music and to the brilliant performances of some eminent master? What better chance have the students in the average American medical colleges of learning their art by merely attending courses of didactic lectures and public demonstrations of practice?

4. The next defect in the system pursued in most American medical colleges is one which, I think, will strike the ordinary mind as the most absurd of all. It is that there is no grading whatever of the classes. Picture to yourself a medical class of several hundred students. Some of them have already devoted two years to the study of medicine, and are familiar with technical terms,

with the elementary branches, and to a certain extent with the more advanced subjects; while others have studied but one year, and are correspondingly uninformed; and others, again, fresh from the high-school, the academy, the farm, or the backwoods, now for the first time find themselves in a medical hall, and hear a language almost utterly unknown to them. Yet all of these sit side by side, and listen to precisely the same instruction. This plan compels the teacher to repeat year after year the same course of lectures, in order that each successive crop of students may begin at the beginning. But it compels him, also, either to lower his teaching so far towards the level of the understanding of the most ignorant, as to sadly waste the time of the further advanced; or else to address himself to the latter portion of his class, and thus allow the new-beginners to flounder along for awhile, overwhelmed by the flood of new terms, by the constant allusions to unknown antecedents, and by the inherent difficulties of the higher branches of medical science. No middle course is possible by which both of these great evils may be avoided, and either of them is of grave importance.

No term-examinations mark or check the progress of the student through this imperfect and inadequate course of education, and when he comes up for final examination for his degree, it is with a sublime confidence in his success, that is as much justified by the almost universal result as it is little merited by his qualifications. It is before no strict, impartial, and unrelenting board of examiners that he appears to rest his chance of success solely upon his merits, but he comes rather before the indulgent members of a business corporation, to whose pecuniary success he has directly contributed, and who are well aware that they cannot afford to acquire the reputation of holding too high a standard or of being too strict to mark what is said amiss, since upon the gratifying success of their students, and the ever-widening circle of their graduates, must depend their classes in the future. I may safely assert that in the most firmly established schools, the proportion rejected does not exceed 1 in 20 to 1 in 50 of the applicants; while I know that in the case of schools still struggling for success, it is almost unknown to find a single student who has not succeeded in twelve or eighteen months in meriting with the highest honor that degree which in other lands the ablest men are proud to receive after four, five, or six years of incessant toil. This results from the fact that in most American medical colleges no fixed salary is attached to the professorships, the incumbents of which are left to derive whatever profit they can

from the fees of the students. It is possible that this arrangement, which, like so many other features of the original system adopted by the Medical Department of this University in 1765, was borrowed from the University of Edinburgh, may have been and may still continue to be comparatively harmless in a country where an intelligent and powerful government exercises supervision over the interests of education, but its influence has been most pernicious in America. In the first place, it created the anomaly of medical schools and universities, nominally under the control of boards of trustees or directors, but in reality almost exclusively under the management of the faculties. This state of things would naturally follow where the faculties are dependent for their profit upon the success of the school, since it would seem invidious for a board of trustees to insist upon any change in the policy of the school unless they were prepared to indemnify the members of the faculty for any reduction in the size of the classes and consequent diminution of their profits that might follow. Thus it has resulted that our medical schools are, to all intents, private business corporations, frequently trading under the sanction of a board of trustees and the dignified title of university, but in reality conducted in the interests, not of the medical profession, not of the community, certainly not of medical science, but of the members of the faculty alone. "This it is," as was eloquently said by one of my colleagues, "which has destroyed the independence of the schools, and has compelled them to perpetuate a system of education which their judgment condemns and their conscience reprobates."*

In the second place, this pernicious system of remunerating medical teachers stimulated to an unheard-of extent the multiplication of medical schools. If it had been possible here, as in all other countries, for the general government to restrict the number of institutions privileged to confer the degree in medicine, and at the same time to insist upon a steady elevation of the standard of education, the dependence of professors upon the students' fees would have been of comparatively little consequence. But the exercise of such control would not only have been impossible, it would have been hostile to the spirit of our people and to the principles of our national government. Accordingly, when the oldest and most distinguished schools set the example of adopting the system I have just denounced, it is not surprising that others should

* A. Stillé, M.D. Address before the Society of the Alumni of the Medical Department of the University of Pennsylvania, 1873, p. 20.

have followed it. Under this system it requires no capital to go into the business of making doctors. No permanent endowment fund is required, the interest alone of which is to be expended in the payment of fixed salaries, while the fees may, in part at least, be devoted to improving the facilities for instruction, or to founding scholarships for poor but meritorious students. No such elements of permanence and independence characterize the numerous brood of medical schools which have sprung into existence during the past half century. A number of physicians determine to start a new school in some city or growing town: a charter is readily obtained; the classic seven branches are amicably distributed among themselves; twelve or twenty-four respectable citizens are easily found who are willing to serve on a board of direction; a suitable building is bought or rented; the press is made liberal use of to announce the birth and vaunt the special attractions of the new member of the sisterhood of medical schools; and the work of teaching begins.

The professors themselves are in part remunerated by the prominent position which they acquire among the local profession, and further, by the widespread notoriety which is given to their names by the constant advertisements in the medical press. When to these influences is added the natural tendency of the graduates of any school to call their former teachers in consultation in all emergencies, it will be understood that in most cases the possession of a professorship is a guarantee of a lucrative practice. The only direct receipts of the school are the fees of the students; and thus the faculty is urged by every argument of self-interest and vanity to spare no effort or expedient by which the size of their classes may be augmented. The natural and proper mode of attaining this end would seem to be by improving the character of the instruction, and enlarging the facilities of education so as to render the school more renowned and attractive than its rivals. But this would involve so heavy an increase in many items of expense that it would be easy for less scrupulous schools to underbid and offer to the student a diploma for less money. Nor can we blame the students if, in ignorance of what a professional education should be, with no influence exerted on them by the government, and with a seeming utter indifference on the part of the public and the profession, they should go whither they can obtain what they seek at least cost. Hence it becomes necessary, under the working of inexorable laws of trade (which are but one expression of the fundamental principles of human nature) for each college to keep down

the cost of its diploma; the length of time required to obtain it; the standard of requirement, and the severity of the examinations, in order that it may compete successfully with its neighbor. The extent to which this will be obligatory will be governed by the closeness of the competition and the degree of over-production which exists. In order to give an idea of the effect which has been produced on medical education by this process, it is sufficient to place before you the figures showing the rate of increase of medical schools. (See Table I., Appendix.)

Following the establishment of the Medical Department of the University of Pennsylvania in 1765, came that of the Medical School of Harvard University in 1782, and that of Dartmouth College (New Hampshire Medical Institute) in 1797. The next decade witnessed the establishment of 4 regular medical schools; 6 more were started between 1819 and 1826; 3 between 1829 and 1834; 10 between 1837 and 1846; 10 between 1847 and 1856; 8 between 1857 and 1866; and no less than 21 between 1867 and 1876. In addition to these, many schools were started, but, after a continuance of longer or shorter duration, were disbanded. Of these no note has been made, the above statement being based upon the statistics of schools now in existence, published by the Department of the Interior in 1876 and 1877. In 1765 the population of the colonies in the aggregate was less than 2,500,000, and that of Philadelphia was about 25,000. During the next 100 years, while the population of the United States increased to about 35,000,000, or 14 times, the number of regular medical schools rose from 1 to 44, with, in addition, 6 Homœopathic and 4 Eclectic Schools, 6 Dental Colleges, and 6 Colleges of Pharmacy. Between 1867 and 1876, the population of the United States increased less than 8,000,000, but, as we have seen, no less than 21 new regular schools of medicine were established. It cannot be questioned that there should be a more or less definite relation between the number of medical schools and the extent of population. This is true in all countries, but especially is it so in America, where nearly all the schools receive no extraneous aid or support, but are dependent solely upon the number of students in attendance. It appears from Table V. (see Appendix), that on the average it has not been found desirable to establish more than one medical school for every 2,000,000 to 4,000,000 inhabitants. This is true not only of thickly peopled countries, such as France and England, but of countries of vast extent and comparatively sparse population, such as Brazil and Russia. I am at a loss to find any valid reason why a law that

holds good all over the world, save in America, should be subject to any exceptions here. Yet, as we have seen, there are to-day in this country, with a total population of about 45,000,000, at least 65 regular schools of medicine, in addition to 11 Homœopathic schools, 4 Eclectic colleges, 14 colleges of Pharmacy, and 12 Dental colleges. As the druggists are in most places largely engaged in the practice of medicine, we may therefore estimate that in this country there is one medical school for, at the most, every 500,000 inhabitants.

The influence of protection upon educational institutions is very different from that which it exerts on manufacturing industries. Had it been possible for the government to have extended its protection to our system of medical education at an early stage, and to have aided in the establishment of a limited number of thoroughly organized schools in different sections of the country, with the condition imposed of maintaining a proper standard of education, the medical profession of America would never have fallen to the low estate it has reached. Unfortunately such protection was impossible, and without it, and stimulated by the peculiar causes I have tried to expose, the evils of unlimited competition have shown themselves in their worst forms. Many schools have been established in places which are entirely unsuitable for the purpose, owing to the absence, among other things, of proper clinical facilities; and, without any disrespect be it said, many schools have been established by persons entirely unfitted for the work. Still, as each school was duly authorized to confer the degree of Doctor in Medicine, and as it is impossible for the public to decide off-hand between those physicians who have received a thorough education, and those who have not, as they can between good and bad butter or bread, the schools have joined in the ruinous policy of reducing their fees, shortening their term of studies, and lowering their standard of requirements in order to avoid being underbid by their rivals. So powerful has this influence been that, when in 1846, in accordance with the earnest recommendation of the American Medical Association, the University of Pennsylvania extended its session of medical studies to six months, not a single other school followed its example. But I declare that there are few events in the history of this venerable University of which, as one of its sons, I am more proud than of this brave attempt to fight single-handed the growing degeneracy of the American system of medical education; and I should be yet prouder of her if, instead of sorrowfully abandoning her advanced position after six years of

steadily diminishing classes, she had thrown down the gauntlet to her rivals, instituted preliminary examinations, insisted upon three years of actual collegiate study, and retained the prolonged session of lectures. Pecuniary loss for a few years she would doubtless have incurred, but long ere this her example would have led to a general elevation of the standard of medical teaching throughout the land, and would have put a stop to the excessive multiplication of poor medical schools with which we now have to contend.

After what has been said, it will not, I think, be gainsaid by any that the following points are in reality grave defects in the American system of medical education: 1, the absence of a preliminary examination; 2, the very short term of studies required; 3, the want of personal training in the practical branches; 4, the absence of any grading of the curriculum; 5, the examination of the candidates for the degree by those having a direct pecuniary interest in their success.

It would be easy to exhibit to you the bad influence which this defective system of education has exerted upon the development of American medical science; but I must limit myself to a consideration of the effect it has produced upon the standing and success of the medical profession, a question which is of the utmost practical importance to each one of you who looks forward to gaining an honest and honorable livelihood by the practice of medicine. I know that there are some who hold that the existing state of things, being the result of the free and unfettered operation of the laws of supply and demand, is natural and therefore admirable; and that there are others who have even brought themselves to believe that both the public and the profession are well satisfied with things as they are and do not desire any changes. But unfortunately such views cannot controvert the clear facts of the case; nor do they help to remedy the evils which they blindly ignore. The first, if not the greatest of these evils which has resulted from our degraded system of education is the enormous over-production of medical men. The unprincipled competition between the schools to secure the largest classes of students, and the easy rates at which diplomas are obtainable, have stimulated extraordinary numbers to study medicine. By a curious coincidence, moreover, the great series of events that have transpired in America during the past fifteen years have all tended to produce a similar effect. The civil war, which broke out in 1861, soon attained such gigantic proportions that, both at the north and south,

a large increase in the number of medical men was necessary to supply the demands of the army and navy. Following the termination of the war in 1865, came a period of inflated prosperity, when the development of our country progressed at an incredible rate. The tide of immigration was setting like a mighty flood towards our shores; our railroad system was stretching its iron threads in every direction, weaving its wonderful network at the rate of 5000 miles a year; every day witnessed the establishment of new centres of mining and manufacturing industry, or the opening of new fields of agricultural wealth throughout the land; villages and even towns sprang into existence as though at the touch of a magician's wand. Side by side with this marvellous expansion came an equally rapid growth in the numbers of the medical profession. There was already enough, and more than enough, of unemployed medical talent in the cities and large towns that should have been drawn upon to supply the new demand, but none the less briskly went on the work of multiplying medical schools and of glutting the market with hastily manufactured doctors.

In 1873, over-production and excessive development had reached a point of such extreme tension that it needed but a slight jar to dash to pieces the fictitious prosperity of the country. The crash came, and our overgrown industries were prostrated amidst the ruins of princely fortunes. Since then scarcely any branch of business has offered sufficient chances of profit to tempt new capital to seek investment in it. The natural result has been that parents, finding it easier and cheaper to start their sons as physicians than in any branch of business, and doubtless supposing that the chances of earning a living would be better in the former occupation while industrial interests were so depressed, have availed themselves of the rare facilities temptingly offered by scores of medical schools. Never has the success—if such it may be called—of these institutions been greater; their number has increased rapidly and the size of the graduating classes has been unprecedented. The returns of the Commissioner of Education for 1875 (Washington, 1876, p. 772) show that at the annual commencements of the 65 regular medical schools in that year there were 2597 graduates. No returns were received from several colleges, so that the total number must be placed at a figure even higher than this. There were also 208 graduates at 12 of the 14 Colleges of Pharmacy. In addition, there were 141 graduates at the 4 Eclectic Colleges; and about 250 graduates at the 11 Homœopathic Colleges. On the whole, therefore, it is within safe limits to esti-

mate the number of practitioners of medicine who were qualified in 1875 at somewhat over 3000.*

Now, in order that a physician shall be able to earn his living from the practice of his profession, it is evident that there must be an adequate number of persons who habitually employ him. There are great general laws underlying every part of our social organization. Marriages, births, deaths, even suicides and murders, are found to stand in certain definite proportions to population, and so will it be found, taking one year with another, that each individual needs a certain definite amount of medical service. Of course, in certain places where the climate is bad and the pursuits of the inhabitants are injurious to health, there will be more sickness than where the conditions of life are more favorable. Of course, also, it is possible for a physician to attend a much larger number of persons in thickly-settled districts or in cities, than in localities where the population is very sparse. But still, taking the length and breadth of the principal countries, it may be said that one thoroughly qualified medical man can minister efficiently to, and in turn be fairly supported by, a population of from 1500 to 2500 persons. The truth of this is fully established by Table II. (see Appendix), which I have prepared to show the number of medical men in proportion to the population, and also the annual number of medical graduates in various countries of very different social conditions.

It will be seen, therefore, that the annual addition to the ranks of the medical profession in America (2000) † would properly correspond with an annual increment to the population of from three to four millions, while actually the yearly increase is not more than one million.

It is difficult to estimate the total number of practitioners of medicine in the United States, but from the most reliable data I can obtain, it may be calculated that there are not less than 60,000,‡

* Dr. J. M. Toner, of Washington City, in a very interesting "Statistical Sketch of the Medical Profession in the United States" (*Indiana Journal of Medicine*, May, 1873, page 1), estimates, from data contained in the Census Report for 1870, that, in addition to all the graduates, the immigration of foreign born and educated physicians is not less than 200 annually (289 per annum from 1860 to 1870).

† Making allowance for an annual mortality among practitioners of medicine of 1000, which is certainly a liberal estimate.

‡ The Medical Register and Directory of the United States, published by Samuel W. Butler, M.D., in 1877, gives the addresses of over 50,000 practitioners, regular and irregular as well. It is, however, certain that a consider-

so that, if the population be taken at 45,000,000, there must be at least one medical man to every 750 inhabitants. In some of the States indeed the proportion of physicians rises as high as 1 to 600, 500, or even 400 inhabitants (see Table III., Appendix).

In a most suggestive little article* Sir James Paget has given us his personal knowledge of what became of 1000 of his pupils within fifteen years of their entrance at St. Bartholomew's Hospital, and it appears that not more than three out of every five succeeded in establishing themselves in even fair practice. A small number of the fortunate ones achieved great success, but the great majority only a moderate degree; while the remaining two-fifths had either very limited success or failed entirely, or else died. The system of medical education in England has been, until very recently, very defective, and there also the profession is much overstocked. But the 1000 students whose career Sir James Paget records, may fairly be taken to represent the best class of medical students who had enjoyed educational advantages above the average, and yet the result can scarcely be considered as encouraging. It is said that Abernethy, in looking round at the crowd of pupils at one of his introductory lectures, exclaimed, as if with painful doubt, "God help you all! what will become of you?" What words of apprehension and anxiety could express the feelings of that honest nature if he were to behold the throng of 3000 graduates

able number have been overlooked, though it is impossible to make any calculation of such omissions. The United States Census Report for 1870 gives the total number of practitioners of medicine as 62,383. This, however, included all who chose to represent themselves as physicians, and probably many not actually engaged in medical practice were registered. Since 1870 there have been not less than 17,500 to 20,000 members added to the profession, while the annual mortality, which, according to the same Census Report, amounted to 947, would not have occasioned a total reduction of more than 8000. Undoubtedly also many practitioners have abandoned the medical profession for other occupations. But making full allowance for all of these, it seems within safe limits to fix 60,000 as the probable number of practitioners of medicine in the United States and Territories at the present time.

Further, it is well known that it is an almost universal custom in America for druggists to prescribe over their counter, and thus to conduct a medical practice often of very considerable size. According to the Census Report of 1870, there were 17,369 druggists and traders in medicine. On the whole, I do not believe that the actual practitioners of medicine throughout the United States bear a lower proportion to the population than 1 to 600.

* What becomes of Medical Students? St. Bartholomew's Hospital Reports, vol. v., 1869, p. 238.

who leave our medical schools each year—so ill fitted for their work?

Within the past few years the complaint has been more and more frequently heard that professional incomes, previously small indeed, have been dwindling away at an alarming rate. The complaint is not an unfounded one; the profession at large is awakening to the fact that its ranks have been fearfully overstocked by the reckless selfishness of the medical schools; and I make bold to assert, well knowing the unparalleled depression of all business interests, that there are but few classes of the community of which a larger proportion are not earning a living than of the medical profession.

There is but one remedy for this state of things, but before I touch upon it, let me remind you that the excessive number of medical men is not the only evil that has resulted from the state of our medical education. We find other evils inseparable from the first, and augmenting its bad influence in the lowering of professional tone, the diminution of public confidence, and the prevalence of open unblushing quackery. It is known to all men that for years the representative medical associations have loudly denounced the system of education in our medical schools; that for years the leading members of the profession have acknowledged its defects and urged an immediate reform; that for years the pages of the most influential medical journals have overflowed with eloquent appeals and unanswerable arguments in favor of an elevated standard of education. In vain—the downward course is ever the easiest; and at last the lowering tone of public and professional sentiment has brought its natural and inevitable result. Medical diplomas and degrees, conferred by “bogus” universities, can be openly bought for 50, 30, even 20 dollars, without attendance on a single lecture or without the pretence of the slightest medical knowledge. The public has no way of distinguishing the owners of these letters of marque from the duly commissioned physician; and now, to our shame be it said, scarce a month passes without the exposure, in some of the leading foreign papers, of cases of horrible malpractice by ignorant quacks holding a “bogus” American diploma. I have so often met with the heading “American Medical Diplomas in Court” in the reports of criminal procedure abroad, that the very words have an ominous and deadly sound to me.

The unscrupulous and unprincipled adventurer, the impostor and the quack, the men who have failed to pass the foreign examination boards, all of these flock to the United States as to a field where, without restriction, they may assume the title of physician

and practice on an equality with the regular profession. Is it any wonder that, while these flagrant abuses exist, and exist without united and determined efforts on the part of all true medical men to stamp them out, and to elevate our own standard so that it shall no longer serve as a cloak for ignorance and incompetence, is it any wonder that public faith wanes and grows dim, that quackery and imposture of all kinds flourish like rank weeds, and that nostrums and patent medicines possess a share of public confidence far larger than ever before?

A third evil, of serious and rapidly growing magnitude, interferes with the success of the practitioners of medicine; and this, too, is largely due to the excessive multiplication and suicidal competition of our medical schools. In the numerous cases where a medical school is started in a town so small that it needs no hospital of sufficient size to furnish material for clinical instruction, the only course open for the faculty is to establish a free dispensary, where applicants can obtain advice and medicine gratuitously on condition of appearing before the medical class and serving as the text for a clinical lecture. This is rarely objected to, and in nearly every instance the free dispensary succeeds famously and soon numbers among its patrons a considerable proportion of the community. But it is not only in smaller towns, but in great cities as well, that a free dispensary comes to be regarded as the necessary feeder to the clinic of a hospital or medical school. In New York, in Philadelphia, and in other large American cities, the attendance at dispensaries has already reached prodigious dimensions. But one result can follow from the unlimited development of this free dispensary system. At first the attendance is chiefly confined to the really poor, but as the reputation of the dispensary spreads, a better class of patients apply, and finally there are found, among the throngs who crowd the waiting-room, large numbers of well-to-do people, fully able to pay a moderate fee for medical advice, and who would scornfully resent the proposal that they should beg for any of the necessities of life. Yet it is practically as mendicants that they appear at the dispensary, and thus by slow degrees these institutions exert a pauperizing influence on a considerable portion of the community, and interfere most seriously with the legitimate business of the medical practitioners. In London, the rivalry of the medical schools, with the inseparable desire on the part of each to offer the most extensive clinical advantages, has fostered this injurious system of free dispensaries, until, as Sir Charles Trevelyan asserts, not less than one-fourth of the population

depends on gratuitous medical relief. At this moment the profession at large are up in arms against it there, and it is evident that in America also the evil is rapidly approaching a stage at which some restriction must be imposed upon it.

I have thus sketched for you three serious impediments which stand in the way of professional success. I have not alluded to the difficulties of medical science itself. I have not dwelt upon the grave responsibilities of the life and work of a physician. All this has been done often enough by more eloquent voices than mine. I have confined myself to the consideration of that humble and unattractive topic—yet which I assure you is the fundamental and essential one here as in all occupations—of the difficulties in the way of earning a living in the practice of medicine at the present time.

The three chief obstacles to which I have alluded are: 1. The excessive overstocking of the profession; 2. The prevalence of quackery, and the diminution of public confidence; 3. The abuse of medical charities. And I have given you my reasons for holding that all of these are inseparably connected with, and to a very larger extent dependent on, the needless multiplication of medical schools, the excessive competition for classes, and the degraded state of medical education. Is it possible that any one familiar with these truths can say that reforms in medical matters are not desired either by the profession or by the public? On the contrary, I can assure you from the testimony of hundreds of competent authorities, that the time has arrived when both the profession and the public are prepared to demand that reforms—yes, extensive reforms—shall be made in the American system of medical education. But in the approach of this, as of all true reforms, although the daring assaults of impatient leaders may, for a time, seem to fail utterly in making any impression upon the strong barriers of established custom and vested interests, there is a silent and gradual development of public opinion and conviction which at last attains a power that sweeps down all opposition.

“Thus, while the tired waves, vainly breaking,
Seem here no painful inch to gain,
Far back, through creeks and inlets making,
Comes silent, flooding in, the main.”

I should, however, but half discharge my duty to you if I stopped with this gloomy review of the present position of the medical profession in America. I must endeavor, also, to point out the way in which it can best be remedied, and particularly the course which seems wisest for all students of medicine at present to pursue.

There are two plans which have suggested themselves for securing the desired elevation of the profession and of medical education. The first of these is that those colleges which choose to do so should provide for a thorough post-graduate course, which should be equivalent to the course of instruction in European medical schools; and that upon those students who should successfully pass through this course, a second and higher title should be conferred. It would not make much difference what title was chosen, provided the public should come to recognize its significance, and to regard those physicians who are entitled to it, as of a higher grade than the rest, better and more thoroughly fitted for their work, and therefore deserving of more confidence. This proposal certainly commends itself by its simplicity and ease of execution, but there are several considerations which make me doubt if it would produce the desired effect.

The most serious objection is, that if such a supplementary title were adopted, the degree of M.D., with the licence to practice, would continue to be conferred on those who merely complied with the present requirements for that degree. Thus, after pretending to reform medical education, it would still be necessary to assume that students were fitted to graduate and enter into practice after a course of instruction which is now, with good reason, charged with being utterly inadequate.

Moreover, it is to be feared that it would be difficult to get the public to understand the real practical difference between one who was a mere M.D. and one who had acquired the additional and higher title. Yet it would be essential that this should be clearly done, in order that the physician, who had incurred an outlay far greater than ordinary for his diploma, should be remunerated by a larger degree of public confidence, and by more rapid success in practice. Nor would this be rendered easier by the fact that, in those countries where two degrees in medicine are conferred, the lower degree is that of Licentiate or Bachelor, for which from four to six years of study are requisite, and which confers the full right to practice. The degree of Doctor of Medicine is there the higher title, and bestows a certain amount of prestige upon its possessor, so that he would naturally be preferred, other things being equal, to a mere Licentiate or Bachelor. In addition to this, it is necessary in many countries for any medical man who aspires to official or academic appointments to obtain the degree of M.D. It seems probable that the exceptional honor attached to this latter title abroad would add to the difficulty of degrading it here to the second place.

It may also be anticipated, that if one or two important colleges

were to agree upon such a supplementary degree, it would be a difficult task to induce other schools to refrain from offering some analogous degree on easier terms, or even from underbidding, as heretofore, by offering the same degree for a much lower grade of acquirements.

Finally, it is evident that, just as we now find the degree of M.D. openly sold for trifling sums, or even deliberately assumed by many who have no right whatsoever to it, this proposed higher degree would soon become an article of illicit traffic, and be bought or forged by the same class of quacks and impostors who now prey on a credulous community.

As it seems impossible by this method either to advance the average education of the graduates in medicine, or to protect those who should acquire the higher degree, it is necessary to seek some other plan. Nor, when all the difficulties of the question are taken into account, does it seem possible that any can be successful which does not involve the intervention of governmental aid. It is manifestly impossible for the national government to undertake the supervision of the whole subject, and, with the advice of experts, to lay down definitely the character of preliminary examination, the duration of study, and the arrangements of the curriculum necessary for all applicants for the doctorate; and to appoint boards of examiners, before whom all such applicants should appear, in order to stand a fair and impartial examination. But that which may not be done by Congress for the whole country, can readily be done by the Legislatures of the several States. There would seem to be no insuperable difficulty in framing a law which should prescribe the number of years to be devoted to medical studies before graduation, and which should further provide for the creation of a State board of examiners, who alone should have the right to confer licences to practice within the limits of that commonwealth. By this simple means all medical schools, regular, homœopathic, or eclectic, would be compelled to provide such a course of instruction as experience and sound reasoning approve; and the qualifications of all applicants for the licence to practice would be passed upon by an impartial board having no direct personal interest in the result. I am entirely in accord with the views which my colleague, Prof. H. C. Wood, has expressed on this vitally important subject,* and I feel with him that the existence of so-called medical sects offers

* Lippincott's Magazine, Dec. 1875, p. 710. "Medical Education in the United States."

difficulties in carrying out this plan which are far more imaginary than real. The method which has worked successfully in Canada could probably be applied in the United States, viz., "To a board which examines in all such branches of medical science as are common to all the sects, might be appended supplemental boards, which should examine in therapeutics only, the candidate selecting at will the representatives of the regular, homœopathic, or eclectic system." This plan would apparently meet all the requirements of the position. It would not interfere with the medical colleges, which would still confer the degree of M.D. precisely on such terms as they chose to do; but it would compel all those which aspired to graduate medical men, thoroughly trained and fitted for their responsible work, to adopt reforms in their system of education analogous to those upon which I have dwelt. It would absolutely exclude from the State which should adopt such a law all quacks and impostors, and, no less, all half-educated, incompetent medical men. It would afford proper protection to the community in one of its most vital interests. It would afford protection to the medical profession by aiding to prevent the excessive overstocking of its ranks, by excluding the uneducated and the unprincipled, and by favoring a return of that firm confidence on the part of the public, which is our surest support. It would be to the advantage of the medical student, because, while rendering it more expensive and difficult to obtain the degree, and licence to practice, it would insure to the successful candidate tenfold greater chances of subsequent success than he now possesses. I have not attempted to go into any of the details of such a measure, because it will be time enough to do that should it come before the public in a practicable shape. There is little doubt that its adoption would be strenuously opposed by all the representatives of a lower grade of medical education, but if its operation would be attended with great advantages to all classes, it does not seem too sanguine to hope that some such measure may be enacted ere long.

But for you, as well as for all those who believe that a more thorough system of medical education is an urgent necessity, it is essential that immediate action should be taken. While public and professional opinion is developing and shaping itself upon the larger modes of dealing with these questions, it is possible for the medical schools themselves to take the initiative. The time has come when it is necessary to do so. The time has come when those schools which would be true to themselves, to their Alumni, and to the weighty interests entrusted to them, must make an advance in

their system of education. Not only in the interests of medical science, not only in the interests of the community, but in the interests of their students, must this be done, in order to qualify these to win public confidence and to succeed in the hard struggle that awaits them. I speak solemnly to you, because I feel the grave responsibility of uttering such advice; but, from my inmost heart, I assure you that in the present state of the medical profession your only sure road to practical success lies, not in securing your diploma where it can be had most easily and quickly, but in securing the very best education that can be obtained.

It is not to be expected, for it is not possible, that there should be immediately instituted in this country a system as full and elaborate as that which exists in foreign countries. But it is absolutely necessary that certain moderate but vital changes should be made in our system as it now exists. Those of you who remember what has been said of the chief defects of this system will readily suggest the needed reforms. They are as follow:

1. The establishment of a preparatory examination.
2. The lengthening of the period of collegiate studies to at least three full years.
3. The careful grading of the courses.
4. The introduction of ample practical instruction of each student both at the bedside and in laboratories.
5. The establishment of fixed salaries for the professors, so that they may no longer have any pecuniary interest in the size of their classes.

It is useless to continue to heap, one on another, additional facilities which may be taken advantage of or not according to the inclination of the student. Public attention is at length fully aroused, and you may depend upon it that very soon public confidence will be bestowed on the diplomas of those schools only which guarantee that every graduate who leaves their halls has received a full, thorough, and practical medical education.

I have told you that in 1846 the University of Pennsylvania, whose medical department is the oldest medical school in America, made an unsuccessful attempt to elevate the standard of medical education; and now, when the fulness of time has arrived, it is but fitting that she should again come forward as a leader, and take the position to which her venerable age and illustrious record entitle her. But the honor of having been the first to adopt the essential reforms which I have just enumerated fairly belongs to the Medical School of Harvard College. In 1871 the authorities of that great Uni-

versity, which most justly ranks first among American literary schools, determined that the system of education in the medical department should be reformed, so as to place it on the level of the other departments. There, as elsewhere, the plan met with the strongest opposition, and there were not wanting many who prophesied its early and humiliating failure. But, in spite of discouragement and opposition, the needful reforms were instituted; and already, in the course of six years, the school has reached a degree of brilliant success that it never before enjoyed. Hereafter, when the historian of the growth of education in America describes the hard struggle which was needed to establish true scientific medical education, it is to Harvard that he will award the praise of having been the first to step into the arena.

Almost at the same time, the authorities of the University of Pennsylvania took into earnest consideration the plan of medical teaching that had long been pursued here, with the determination to make such changes in it as might seem required. It will readily be believed that the subject received the full, calm study which it demanded, and that no single step was resolved upon that it was not confidently believed would be heartily endorsed by the graduates of the school and by the entire community. But when all the facts which I have endeavored to lay before you came to be known, and when it appeared that the one and only way in which a medical school can now meet its obligations to its students, to the public, and to science, is by elevating its standard of education, no hesitation was felt in deciding that, as soon as the necessary preliminaries were arranged, this great step should be taken. Assurances were received from generous friends of the institution that rendered it certain that the intended changes could be successfully maintained, even if a temporary decrease in the size of the classes should occur. Every detail of the new plan was carefully considered, and when the whole was fully matured, it was announced to the world in May, 1877, that the system of medical education, which had been conducted here for more than a century, had been replaced by a higher and better system, one more in accordance with the condition of medical science and the wants of the community.

Those of you who are familiar with the features of the present University curriculum will not need to be reminded that, with one exception, it embodies all of those changes which our study of the defects of the American system of medical education has shown to be required. The one omitted is the examination preparatory to matriculation, a feature to which great importance is properly

attached. It was not thought feasible to insist upon this immediately ; but all agreed that it must be instituted as soon as possible. For those of you to whom the details of the plan are not yet familiar, I may be pardoned for briefly alluding to some of its excellences as compared with the system pursued at other schools.

The first great advantage is, that each and every student is required to attend three years of college instruction. I believe it is universally admitted that it is simply ridiculous to expect any student to acquire a satisfactory knowledge of medicine in less than that time. Now, it is perfectly true that in other schools there is nothing to prevent a student from attending lectures for three or four years, but as the system is arranged so as to allow students to graduate after only two years' study, it is impossible for those who choose to study longer to occupy the extra time to the best advantage. They can spread out over three years the instruction which the vast majority take in two years, but they cannot supply the numerous deficiencies it presents. In the largest cities it may be possible to do so in part by paying liberal extra fees to teachers who give private instruction in various branches ; but even then they receive only the teaching of comparatively young and inexperienced men, and not of their own professors. In the case of most medical schools, moreover, no such additional instruction can be secured even by paying extra fees for it. In the University curriculum, on the other hand, advantage has been taken of the extra year to grade the entire course of teaching, so that the student passes by a natural gradation from the elementary branches to those which are more complex and practical. The absurdity which we have fully exposed no longer exists, by which students of every grade are placed together to hear the self-same instruction repeated year after year. Instead of this, in the University course, while a sufficient amount of repetition of the most difficult subjects is secured, each class of students pursues by itself those studies which are suited to its stage of advancement. The number of hours devoted each day to didactic lectures is, therefore, less than at other schools, and the hours thus set free are utilized, during the first two years, for thorough instruction in laboratory work and in practical anatomy ; and, during the last year, for careful instruction in clinical medicine and surgery, and in some important special branches. Partial examinations at the end of each year will enable the successful student to get rid of certain branches, and thus, as he advances, to bring to bear all his acquirements and ability with greater concentration upon the important practical studies.

A few words more are needed to describe fully how thorough is

the plan proposed for laboratory and clinical work. It would, indeed, have been impossible to undertake such a plan were it not for the completion of this magnificent medical hall, which presents unequalled facilities for practical work in the laboratory and the dissecting-room, and for the two great hospitals which stand in the immediate vicinity and afford unlimited material for clinical illustration. We have profited to the utmost by these advantages in the arrangement of the new plan. In the first place, the student will during the first year have no less than fifteen hours in each week set apart for dissections—anatomical material will be furnished free to him—and thus a more thorough knowledge of practical anatomy will be secured than is elsewhere provided for. In the hurry and cramming which goes on during a two years' course, less and less place has of late been found for dissecting. Yet all must know that a close practical familiarity with anatomy is the only true basis, not merely of surgery, but of physiology and of medicine. Again, I need not remind you of how great importance must be to every physician a knowledge of the microscope, of practical pharmacy, of practical chemistry, and especially of medical chemistry. These are subjects which cannot be taught by lectures alone, for the student must be taken directly into the laboratory and there trained personally in the manipulations and the use of tests and reagents. In most other schools such advantages are never furnished without extra cost; while in this University the classes of the first and second year will be divided into sections of convenient size, and each student will receive personally from his professor practical instruction in the laboratory on all of these subjects.

But it is in the arrangement of the third year that the great superiority of the University course is most clearly shown. I have already dwelt upon the entire absence from the usual system of medical education of any real personal teaching in the practical branches. Every one admits that this is the greatest defect of the system, since it compels the vast majority of graduates to enter on the practice of their profession without the slightest practical training. In consequence, special care has been taken to provide for this need in the fullest possible manner in the new University plan. The third year class will be divided into sections of suitable size, each of which will receive daily instruction in connection with the hospital wards or the dispensary department in practical medicine, surgery, and gynecology, in auscultation and percussion, and electro-therapeutics. In addition, similar practical instruction will be given in such important specialties as ophthalmoscopy, diseases of the ear

and of the skin. The teaching in all of these branches will be directly conducted by the professors of the respective chairs, but the study of the last-named specialties will not be obligatory upon the student. Thus, every student of the University of Pennsylvania will hereafter enjoy the advantages of a course of practical instruction more thorough and complete than is attainable elsewhere on this continent.

Moreover, while such generous provisions have been made for the regular winter terms, equal care has been taken to make the preliminary course in September, and especially the Spring course, more full and valuable than in any other school. Every inducement is offered to students to take advantage of these supplementary courses which, although not at all obligatory, will be found highly profitable. Every facility is also provided for those who may desire after graduation to pursue the more advanced study of certain special branches.

Such are the advantages now offered by the University course; but it is not to be supposed that they have been secured without much self-sacrifice and exertion on the part of the Faculty. In order to carry this plan into effect many of them have voluntarily assumed a twofold or even threefold increase of their labors. In order to free your diplomas from the taint of having been conferred through partiality or self-interest, their direct pecuniary relations with the students have been transferred to the Board of Trustees, and the members of the Faculty now receive fixed salaries.

I have now spoken of the advantages of the new plan, and a few words will suffice to consider the greater taxes which it imposes on the student. As the specific object of the change has been to secure a higher grade of education, I need not say that hard work, faithful application, and good attainments will be required. But besides these the fees are increased, being \$100 more than at most schools, and it will be necessary for every student to bear the expenses of residence in the city during three terms. It is evident, therefore, that from this time forward, those medical students who wish to secure a diploma at the lowest price, in the shortest time, and, I need not add, of the least value, will find no place in the class of the University. But, on the other hand, all those students who are willing to give three years to the study of their profession, and are anxious to obtain a thorough education, will find that the course of this University presents the greatest advantages for the least cost. I have pointed out that at the ordinary medical schools,

the student must pay an extra fee for every course of real practical instruction he obtains, and if it were possible for him to secure such extended and thorough practical teaching as is included in the University plan, it would cost not only \$100, as is here charged, but at least \$250.

This, then, is not a course only for the sons of rich men or for students favored with more than ordinary means; but while it does provide the best education that can be purchased by money, it provides it at so low a cost as to be within the reach of all. Not only so, but, by the liberality of the Board of Trustees, the recommendation of the Medical Faculty has been approved, which provides a certain number of free scholarships open by competitive examination to all deserving applicants. It is the expectation that, as the endowment of the medical department increases, the number of these free scholarships will be correspondingly increased, so that the advantages of the University course shall be accessible even to the poorest, if only possessed of merit and ambition.

I trust I have made it clear that not only the highest motives, but also the claims of self-interest, urge all students to pursue such a course of instruction in medicine as is now established at this University. The effect cannot be supposed to consist only in the better preparation for practice which they will receive. It must be remembered that the full discussion of this question has occupied the press, both general and medical, from one end of the country to the other. Public attention and interest are keenly alive to the importance of the subject, and the course of the medical schools is closely watched. When, then, the oldest and most distinguished of these schools takes so important a step as that which the University of Pennsylvania has just taken, you may be assured that, all over the country, the success of the movement and the careers of those who graduate under the new plan will be watched with unusual interest. We claim, without fear of contradiction, that the course of study you must pursue here will fit you better for the practice of your profession than the course pursued at most other schools. We claim that you, as graduates of the University of Pennsylvania, will be entitled to a higher degree of public confidence than can be accorded to the graduates of those schools whose diplomas cannot be regarded, to an equal extent, as guarantees of thorough practical education in medicine. It is our intention that these facts shall be known to every inhabitant of this country; and in order that the graduates of this University shall profit by that exceptional consideration to which they will be justly entitled, it is

essential that they shall proclaim the honor they enjoy by affixing to the title of M.D. the words *University of Pennsylvania*. The effect of this will be inevitable. It will be known to all that the system of education here pursued makes our diploma a guarantee of thorough fitness for the practice of medicine; the public will more rapidly bestow their confidence upon those who possess it, and a more rapid and certain success will follow. Now that Harvard College, Chicago Medical College, the University of Michigan, the University of Syracuse, and the University of Pennsylvania have successfully adopted the higher system of medical education, it will be impossible for other schools to avoid one of two necessary results. Those among them which are firmly established, well equipped, and situated in favorable localities, must speedily follow the example that has been set. They cannot afford to incur the invidious comparisons that will constantly be made between their position and that of the more progressive schools. On the other hand, such schools as are ill-equipped and ill-fitted in every way to sustain a high grade of education, must either suspend operations, or must consent to turn out graduates of a lower grade, and who will soon be recognized as such by the public. Many of these graduates will doubtless attend a third year at a reformed medical school, for the benefit of the organized practical teaching there attainable, and for the sake of a degree conferring real distinction upon its recipient.

I speak confidently of the results of the new plan adopted by the University, but it is not without substantial reasons. Although announced but a few months since, the most unqualified endorsements have been bestowed upon it from all quarters, both at home and abroad. The great army of our Alumni who are scattered over the habitable globe, everywhere cherishing a true and loyal love of Alma Mater, and everywhere aiding to elevate her fame by their devotion to humanity and by their able discharge of all the duties of most varied and responsible positions; these have signified in no uncertain way their warm approbation of this great advance on the part of the University. It may be confidently assumed that the entire medical profession will unite in supporting the schools which have ventured to make the long-needed reforms in medical education. None know so well as they the defects of the prevailing system; none know so well as they the disadvantages under which the medical profession labors at the present time; none know, therefore, so well as they that the best way to insure the success of their sons or of their students who are to follow in their own footsteps, is

to provide them with a sound, true, and practical training for their professional work.

It is true that, on the announcement of the important changes in the system of education in this school, grave doubts were expressed by many of its warmest friends lest such serious falling off in the classes might result as to render it impossible to maintain permanently the advanced position assumed. I have, however, already informed you that, through the almost spontaneous liberality of a number of citizens, a guarantee fund was secured of sufficient size to make it certain that the new course should be sustained, even though a reduction in the size of the classes, greater than was anticipated by any one, should occur. It was only after this essential safeguard was provided that the Trustees ventured on a step which seemed to many to seriously compromise the future welfare of the school.

But, in addition to this, an event of such noteworthy character as to demand special mention soon occurred to strengthen their position, before the final verdict of success was given by the assemblage of a class, whose large size and representative character express the deliberate approval of our course entertained throughout the land. The event to which I refer is the presentation of the sum of \$50,000 for the endowment of the chair of Surgery in the University of Pennsylvania. This noble gift has been made by Mrs. John Rhea Barton, the widow of one of Philadelphia's most eminent surgeons. He was the nephew of Dr. Benjamin Smith Barton, who filled with applause various chairs in the Medical Department of the University during a period of twenty-six years, and whose reputation as a botanist and scientist was world-wide. Dr. John Rhea Barton himself graduated at this school, and rapidly rose to a position of eminence in the medical profession, equal to that of his illustrious relative. Connected as he was for many years with the surgical staff of the principal hospital in Philadelphia (Pennsylvania Hospital), and enjoying the highest public esteem and reputation, he had ample opportunities for displaying the rare combination of qualities—accurate observation; ready, sure decision; sound practical judgment; great brilliancy and dexterity in operating; and unrivalled fertility of resources—which justly entitle him to rank as one of the greatest surgeons of America. Few medical men have enjoyed a higher and more wide-spread reputation than did Dr. Barton during his lifetime, and his valuable additions to the art of surgery have kept his name familiar as a household word. He himself, by his skill and achievements, erected

an enduring monument in the annals of surgical science, and in the grateful memories of his fellow-men. Yet it is surely most fitting that there should be established this new monument to his memory; and that henceforward for all time the students of this University should learn to revere the name and to emulate the deeds of the illustrious man in whose honor the Rhea Barton Chair of Surgery has been established.

It is felt, therefore, that the University of Pennsylvania, confident of lofty success, may look forward to a most brilliant future for her Medical Department. But none the less would we appeal to all, not only to her Alumni, but to all who are interested in the advancement of medical science and in the elevation and true success of the medical profession, to aid us by their active sympathy and co-operation. Still wider would we make our appeal. It is possible that for a few years the size of the classes may not be so great as under a less elevated and exacting system. It is certain that for the full development of the wise and generous measures now initiated by the Trustees of the University of Pennsylvania, large expenditures must of necessity be incurred. We would appeal, then, to all who are interested in the cause of pure education, in the development of truth and knowledge, or in the welfare of the community, to aid this venerable institution in the great work in which she is engaged, not only with their sympathy, but with generous contributions to her endowment funds.

Never before was it so proud a distinction to be connected with this great school as student, as teacher, or as patron; because never before was she so truly great as now, when springing forward in the vigor and enthusiasm of renewed youth, she plants far in advance the sacred standard committed to her trust, and summons around her all true, brave spirits who, to win the crown, fear not to endure the burden and the toil.

APPENDIX I.

TABLE I. (A. and B.)

THE following table shows the date of organization of the 106 medical schools of various kinds, and also their distribution throughout the various States :

A.

| | | Regular. | Homoeopathic. | DATE OF ORGANIZATION. | | | |
|----|----------|----------|---------------|-----------------------|-----------------|---------|--|
| | | | | Eclectic. | Pharmaceutical. | Dental. | |
| 1 | 1765 | 1 | | | | | <div> R. H. E. P. D. 101 years : 44 : 6 : 4 : 6 : 6 = 66 </div> |
| 1 | 1782 | 1 | | | | | |
| 1 | 1797 | 1 | | | | | |
| 4 | { 1807 | 2 | | | | | |
| | { 1809 | 1 | | | | | |
| | { 1813 | 1 | | | | | |
| | { 1819 | 1 | | | | | |
| 6 | { 1820 | 1 | | | 1 | | |
| | { 1821 | | | | | | |
| | { 1824 | 1 | | | | | |
| | { 1825 | 2 | | | | | |
| 3 | { 1826 | 1 | | | | | |
| | { 1829 | | | | 1 | | |
| | { 1832 | 2 | | | | | |
| | { 1834 | 1 | | | | | |
| 10 | { 1837 | 2 | | | | | |
| | { 1839 | 1 | | 1 | | | |
| | { 1840 | 1 | | | | 1 | |
| | { 1841 | 1 | | | 1 | | |
| | { 1842 | 1 | | | | | |
| | { 1843 | 1 | | 1 | | | |
| | { 1844 | 1 | | | | | |
| | { 1845 | | | | | 1 | |
| | { 1846 | 2 | | | | | |
| | { 1847 | 1 | | | | | |
| 10 | { 1848 | 1 | 1 | | | | <div> R. H. E. P. D. 10 years : 21 : 5 : 0 : 8 : 6 = 40 </div> |
| | { 1849 | 1 | 1 | | | | |
| | { 1850 | 2 | | | | | |
| | { 1851 | 1 | | | | | |
| | { 1852 | 2 | | | | | |
| | { 1853 | 1 | | | | | |
| | { 1855 | 1 | | | | | |
| | { 1856 | | | | | 1 | |
| | { 1857 | | | 1 | | | |
| | { 1858 | 1 | 1 | | | | |
| 8 | { 1859 | 1 | 1 | | 1 | | |
| | { 1860 | 2 | 1 | | | | |
| | { 1861 | 1 | | | | | |
| | { 1863 | | 1 | | | 1 | |
| | { 1864 | 3 | | | 1 | | |
| | { 1865 | | | 1 | | | |
| | { 1866 | | | | 1 | 2 | |
| | { 1867 | 1 | | | 1 | 3 | |
| 21 | { 1868 | 3 | | | 1 | | |
| | { 1869 | 3 | | | | | |
| | { 1870 | 2 | | | 1 | | |
| | { 1871 | 1 | | | 1 | | |
| | { 1872 | 3 | 1 | | 3 | | |
| | { 1873 | 3 | | | | 1 | |
| | { 1874 | 3 | | | | 1 | |
| | { 1875 | | 3 | | | | |
| | { 1876 | 1 | | | | 1 | |
| | { Unkn'n | 1 | | | 1 | | |
| | | | | | | | |
| 65 | | 65 | 11 | 4 | 14 | 12 | 106 |

Calculated from data given in Reports of Commissioner of Education for 1875 and 1876.

B.

| STATE. | Regular Schools. | Homœo- pathic. | Eclectic. | Dental. | Pharma- ceutical. |
|---------------------------|---------------------|-------------------|-----------|---------|----------------------|
| Alabama | 2 | ..... | ..... | ..... | ..... |
| California | 2 | ..... | ..... | ..... | 1 |
| Carolina, South | 2 | ..... | ..... | ..... | ..... |
| Columbia, District of . . | 3 | ..... | ..... | ..... | 1 |
| Connecticut | 1 | ..... | ..... | ..... | ..... |
| Georgia | 3 | ..... | 1 | ..... | ..... |
| Illinois | 3 | 1 | 1 | ..... | 1 |
| Indiana | 3 | ..... | ..... | ..... | ..... |
| Iowa | 2 | ..... | ..... | ..... | 1 |
| Kentucky | 5 | ..... | ..... | ..... | 1 |
| Louisiana | 2 | ..... | ..... | 1 | ..... |
| Maine | 1 | ..... | ..... | ..... | ..... |
| Maryland | 3 | ..... | ..... | 2 | 1 |
| Massachusetts | 1 | 1 | ..... | 2 | 1 |
| Michigan | 2 | 1 | ..... | 1 | 1 |
| Missouri | 4 | 3 | ..... | 1 | 1 |
| New Hampshire | 1 | ..... | ..... | ..... | ..... |
| New York | 9 | 2 | 1 | 1 | 1 |
| Ohio | 7 | 2 | 1 | 1 | 2 |
| Oregon | 1 | ..... | ..... | ..... | ..... |
| Pennsylvania | 3 | 1 | ..... | 2 | 1 |
| Tennessee | 1 | ..... | ..... | ..... | 1 |
| Texas | 1 | ..... | ..... | 1 | ..... |
| Vermont | 1 | ..... | ..... | ..... | ..... |
| Virginia | 2 | ..... | ..... | ..... | ..... |
| | 65 | 11 | 4 | 12 | 14 |
| Total, 106. | | | | | |

TABLES II. AND V. CONSOLIDATED.

| COUNTRY. | Population. | Number of physicians. | Proportion of physicians to population. | Annual number of medical graduates. | Number of medical schools. | Proportion of schools to population. |
|-----------------------------------|-------------|-----------------------|---|-------------------------------------|----------------------------|--------------------------------------|
| Austro-Hungarian Empire | 35,904,435 | 14,361 | 1 to 2500 | 500 to 600 | 6 | 1 to 6,000,000 |
| Belgium | 5,336,634 | 2,048 | 1 to 2609 | 71 | 4 | 1 to 1,334,159 |
| Brazil | 11,780,000 | 1,200 (?) | 1 to 10,000(?) | . . . | 2 | 1 to 5,890,000 |
| Canada | 3,575,577 | 2,998 | 1 to 1193 | 220 | 8 | 1 to 426,947 |
| Chili | 2,200,000 | 240 | 1 to 9167 | 25 to 30 | 1 | 1 to 2,200,000 |
| Cuba | 1,000,000 | 500 | 1 to 2000 | 15 to 20 | 1 | 1 to 1,000,000 |
| France | 36,100,000 | 19,902* | 1 to 1814 | 750 | 6 | 1 to 6,000,000 |
| German Empire | 41,060,695 | 13,686 | 1 to 3000 | 500 to 600 | 23 | 1 to 1,785,248 |
| Great Britain | 32,412,010 | 19,385 | 1 to 1672 | 1743 | 19 | 1 to 1,705,895 |
| Italy | 28,526,000 | 8,000 | 1 to 3500 | 300 | 22 | 1 to 1,296,636 |
| Norway | 1,820,000 | 525 | 1 to 3480 | 25 to 30 | 1 | 1 to 1,820,000 |
| Sweden | 4,500,000 | 600 | 1 to 7500 | 17 | 3 | 1 to 1,500,000 |
| United States | 44,874,814 | 62,383 | 1 to 600 | 3000 | 94 | 1 to 477,392 |
| Venezuela | 1,800,000 | 200 | 1 to 9000 | 10 | 2 | 1 to 900,000 |
| Victoria (Australia) | 731,528 | 434 | 1 to 1686 | 6 | 1 | 1 to 731,528 |

* Of these, 14,718 are physicians and 5184 are only health officers. There are only six academites which give the diploma of doctor of medicine; but there are also sixteen preparatory schools where the diploma of health officer is given. As, however, fully three-fourths of all practitioners of medicine take the diploma of M.D., it is impossible to include the preparatory schools in calculating the ratio of medical schools to the number of population.

TABLE III.

| STATE OR TERRITORY. | Population as given in Census of 1870. | Estimated population in 1877, calculated at rate of 25 per cent. increase in ten years. | Regular Medical Schools, Homœopathic and Ec- lectic Schools, and Col- leges of Pharmacy. | Proportion of schools of medicine and pharmacy to present population. | Number of practitioners of medicine according to Census Report of 1870. | Proportion of practition- ers of medicine to pop- ulation as given in Census of 1870. |
|------------------------|---|--|---|---|--|--|
| Alabama | 996,992 | 1,163,158 | 2 | 1 to 581,579 | 1,418 | 1 to 703 |
| Arkansas | 484,471 | 565,216 | .. | .. | 1,026 | 1 : 481.8 |
| California | 560,247 | 653,622 | 3 | 1 : 217,874 | 1,257 | 1 : 445.7 |
| Carolina, North . . . | 1,071,361 | 1,239,923 | .. | .. | 1,143 | 1 : 937 |
| Carolina, South . . . | 705,606 | 823,207 | 2 | 1 : 411,604 | 789 | 1 : 894 |
| Colorado | 39,864 | 46,508 | .. | .. | 70 | 1 : 569.5 |
| Columbia, Dist. of . . | 131,700 | 153,650 | 4 | 1 : 38,412 | 326 | 1 : 404 |
| Connecticut | 537,454 | 627,030 | 1 | 1 : 627,030 | 680 | 1 : 790.3 |
| Delaware | 125,015 | 145,851 | .. | .. | 170 | 1 : 735 |
| Florida | 187,748 | 219,040 | .. | .. | 248 | 1 : 757 |
| Georgia | 1,184,109 | 1,381,461 | 4 | 1 : 345,385 | 1,537 | 1 : 770 |
| Illinois | 2,539,891 | 2,963,206 | 6 | 1 : 493,868 | 4,862 | 1 : 522 |
| Indiana | 1,680,637 | 1,960,774 | 3 | 1 : 626,796 | 3,613 | 1 : 465 |
| Iowa | 1,194,020 | 1,393,024 | 3 | 1 : 464,341 | 1,865 | 1 : 639 |
| Kansas | 364,399 | 425,133 | .. | .. | 906 | 1 : 402 |
| Kentucky | 1,321,011 | 1,541,180 | 6 | 1 : 256,863 | 2,414 | 1 : 547 |
| Louisiana | 726,915 | 848,068 | 2 | 1 : 424,034 | 939 | 1 : 774 |
| Maine | 626,915 | 731,401 | 1 | 1 : 731,401 | 818 | 1 : 766 |
| Maryland | 780,894 | 911,043 | 4 | 1 : 227,761 | 1,257 | 1 : 621 |
| Massachusetts | 1,457,351 | 1,700,243 | 3 | 1 : 566,748 | 2,047 | 1 : 711 |
| Michigan | 1,184,059 | 1,381,403 | 4 | 1 : 345,351 | 2,034 | 1 : 582 |
| Minnesota | 439,706 | 512,991 | .. | .. | 402 | 1 : 1093 |
| Mississippi | 827,922 | 965,909 | .. | .. | 1,511 | 1 : 547 |
| Missouri | 1,721,295 | 2,008,178 | 8 | 1 : 251,022 | 3,560 | 1 : 483 |
| Nebraska | 122,993 | 143,492 | .. | .. | 247 | 1 : 498 |
| Nevada | 42,491 | 49,573 | .. | .. | 110 | 1 : 386 |
| New Hampshire | 318,300 | 371,350 | 1 | 1 : 371,350 | 565 | 1 : 563 |
| New Jersey | 906,096 | 1,057,112 | .. | .. | 1,208 | 1 : 750 |
| New York | 4,382,759 | 5,113,219 | 13 | 1 : 393,324 | 6,810 | 1 : 642 |
| Ohio | 2,665,260 | 3,109,470 | 12 | 1 : 259,123 | 4,638 | 1 : 574 |
| Oregon | 90,923 | 106,077 | 1 | 1 : 106,077 | 206 | 1 : 441 |
| Pennsylvania | 3,521,951 | 4,108,943 | 5 | 1 : 821,789 | 4,843 | 1 : 727 |
| Rhode Island | 217,353 | 253,579 | .. | .. | 260 | 1 : 836 |
| Tennessee | 1,258,520 | 1,468,274 | 2 | 1 : 734,137 | 2,220 | 1 : 566 |
| Texas | 818,579 | 955,009 | 1 | 1 : 955,009 | 1,906 | 1 : 429 |
| Vermont | 330,551 | 385,643 | 1 | 1 : 385,643 | 569 | 1 : 580 |
| Virginia | 1,225,163 | 1,429,357 | 2 | 1 : 714,679 | 2,126 | 1 : 576 |
| West Virginia | 442,014 | 515,683 | .. | .. | 612 | 1 : 722 |
| Wisconsin | 1,054,670 | 1,230,450 | .. | .. | 915 | 1 : 1043 |
| <i>Territories—</i> | | | | | | |
| Arizona | 9,658 | 11,268 | .. | .. | 22 | 1 : 439 |
| Dakota | 14,181 | 16,545 | .. | .. | 20 | 1 : 709 |
| Idaho | 14,999 | 17,499 | .. | .. | 33 | 1 : 454 |
| Montana | 20,595 | 24,028 | .. | .. | 42 | 1 : 490 |
| New Mexico | 91,874 | 107,187 | .. | .. | 27 | 1 : 3402 |
| Utah | 86,786 | 101,251 | .. | .. | 46 | 1 : 1836 |
| Washington | 23,955 | 27,948 | .. | .. | 43 | 1 : 557 |
| Wyoming | 9,118 | 10,638 | .. | .. | 24 | 1 : 380 |
| | 38,558,371 | 44,874,814 | 94 | 1 : 477,392 | 62,383 | 1 : 618 |

TABLE IV.

THE following countries, of whose systems of medical education a sketch is given, are arranged alphabetically for convenience of reference, but they can be consulted in groups according to certain general resemblances in their systems. Thus, the German Empire, the Austro-Hungarian Empire, and Russia would form one such group, and Sweden, Norway, and Denmark another. France occupies a position peculiar to herself. Holland and Belgium are closely similar to each other. England, Scotland, and Ireland are included under Great Britain, and these, with Canada and Australia, form another natural group, although with certain points of marked dissimilarity. Italy and the Portuguese and Spanish-speaking countries form a final group, all the members of which possess a system of medical education essentially identical.

There are a few expressions that will frequently occur, particularly in regard to continental countries, to which a special meaning is attached. Among these may be mentioned, as requiring definition, "Certificate of a gymnasium," which evidences upon its holder's part a thorough knowledge of Greek, Latin, at least one modern language besides his own, logic, the physical sciences, and mathematics.

The "Certificate of Grammar" is an expression peculiar to the French system, and will be found defined under that head.

The "Año de ampliacion" is the term applied in Spain, Brazil, and other Spanish or Portuguese-speaking countries to the first year of professional study, in which botany, zoölogy, physiological chemistry, and the rudiments of geology and mineralogy constitute the curriculum.

Australia: population, 1,565,294.—There are two Universities, one at Melbourne and one at Sydney. Before matriculation, the candidate must pass a rigorous examination in languages, mathematics, etc. The course of medical study extends over five years (nine months a year), and includes thorough practical work in laboratories and in hospital wards. The examinations are held annually upon the various subjects of the lectures; and are both written and oral. The final examination includes all the subjects of the fourth and fifth years, with practical tests in dissection, operative surgery, clinical surgery, and medicine. Candidates are required to pass in all the subjects. The degree of M.B. (Bachelor of Medicine), with licence to practice, is then given. To obtain the degree of M.D. (Doctor of Medicine), which is a title merely conferring greater professional prestige, the applicant must have taken the degree of M.B., and subsequently have passed two years in hospital practice, or five years in private practice, including, in either case, attendance for three months on the practice of a hospital for lunatics; and must also pass a special and elaborate examination, both theoretical and practical in character.

The curriculum is arranged as follows:

First Year.—Natural philosophy, chemistry with laboratory practice.

Second Year.—Botany, materia medica and therapeutics, comparative anatomy and zoölogy, descriptive and surgical anatomy, dissection.

Third Year.—General anatomy, physiology, pathology, descriptive and surgical anatomy, surgery, dissection, practical pharmacy, operative surgery, surgical clinics.

Fourth Year.—Theory and practice of medicine, obstetrics and diseases of women and children, general anatomy, physiology, pathology, dissection, clinical medicine and surgery.

Fifth Year.—Theory and practice of medicine, forensic medicine, clinical medicine, and practical obstetrics.

Austro-Hungarian Empire: population, 35,904,435.—There are six medical schools: at the Universities of Vienna, Prague, Innsbruck, Pesth, Clausenburg, and Gratz. They are all supported by the government, and are modelled upon the same plan. To matriculate, the applicant must present a certificate from a gymnasium. The course of study extends over a period of at least five years, of about nine months in each year. The studies are arranged as follows:

FIRST AND SECOND YEARS.

Anatomy.
Physiology.
Chemistry.
Physics.
Botany.
Zoölogy.
Mineralogy.
Histology.

Practical labora- { Microscopy,
tory work in { Chemistry,
 { Physiology,
 { Physics.
Dissection.

THIRD, FOURTH, AND FIFTH YEARS.

Pathology.
Pathological anatomy.
Histology.
Pharmacology.
Post-mortem examination.
Physical diagnosis.
Obstetrics.
Practice of medicine.
Surgery.
Gynæcology.
Medical jurisprudence.
Toxicology.
Ophthalmology.
Clinics and practical work in the wards
of a hospital and in a dispensary.

Examinations are held at the end of the second year upon the various subjects of the first two years, and at the end of the fifth year upon the subjects of the preceding three years. Two or three months after the latter examination, the candidate must pass a third and final one, which secures the diploma of Doctor of Medicine with the right to practice.

The professors have no pecuniary interest in the size of their classes. They have a fixed salary varying from \$1100 to \$2000, with an addition of from \$100 to \$250 every ten years, and have the privilege of giving private courses, by means of which their income may be increased to about \$3500. The fees for the entire course amount to about \$250.

Belgium: population, 5,336,634.—There are four Universities (Liege, Ghent, Louvain, and Brussels). The first two are state universities, and are supported by the government. To matriculate, the applicant must be a graduate of a literary college, since, although this is no longer required by law, most of the universities demand it. If he is not a graduate of such an institution, he must pass a thorough preliminary examination. He then attends for two years a scientific course, including psychology, chemistry (organic and inorganic), physics, botany, zoölogy, and mineralogy, and having passed a satisfactory examination is admitted to the medical department.

The course of medical study extends over five years, and is arranged as follows:

FIRST AND SECOND YEARS.

Descriptive anatomy.
Histology.
Physiology.
Pharmacology.
Comparative anatomy.

THIRD AND FOURTH YEARS.

General pathology.
Therapeutics.
Theory and practice of medicine.
Morbid anatomy.

FIFTH YEAR.

Theory and practice of surgery and obstetrics.

The course also includes practical laboratory work; operative surgery; and attendance for three years upon clinics in medicine, surgery, and obstetrics. Examinations are held at the end of the second, fourth, and fifth years upon the subjects of the corresponding sections of the course. The examination for the degree of doctor of medicine, conferring the right to practice, is held a few weeks after the close of the course, and includes the general subjects of the course, together with practical examinations in clinical medicine, surgery and obstetrics, and in operative surgery. This degree is conferred by the Universities, but the diploma must be legalized by a government commission, whose duty it is to ascertain if all the conditions exacted by law have been complied with.

There is but one class of physicians, but the Universities occasionally give the diploma of "*Docteur Spécial*" in surgery, obstetrics, ophthalmology, etc., to those who, having passed the ordinary examinations and acquired the degree of M.D., pass a more advanced and thorough examination in any of these specialties. The possessor of such a special diploma has the right, which none others but the members of the Faculty possess, of giving private courses of instruction on that specialty.

The medical faculty is made up of ordinary and extraordinary professors, who, although they rank equally, receive different salaries; the former, with regular salary and perquisites, receive from \$2000 to \$2600, the latter \$1000.

Brazil: population, 11,780,000.—There are two Universities, Rio de Janiero and Bahia. To matriculate, the applicant must pass a preliminary examination in Latin, French, English, philosophy, history, geography, and mathematics. The course of medical study extends over a period of six years, arranged as follows:

First Year.—Physics, chemistry, mineralogy, anatomy.

Second Year.—Botany, zoölogy, organic chemistry, physiology, anatomy.

Third Year.—Physiology, pathological anatomy, general pathology.

Fourth Year.—External and internal pathology, obstetrics and diseases of women and children.

Fifth Year.—External and internal pathology, obstetrics, materia medica, and therapeutics.

Sixth Year.—Hygiene, history of medicine, medical jurisprudence, pharmacy.

Ample clinical and practical instruction in the hospital and laboratories is also provided for. Examinations are held at the end of each year upon the studies of the preceding year. Upon passing the final examination, which embraces all the subjects of the above course, and upon the presentation of a thesis, the candidate receives the degree of doctor of medicine with the right to practice.

The students' fees are about \$20 per annum. The professors receive a fixed salary from the government, and are independent of the size of their classes. The appropriation for the annual expenses of the two schools in 1873 was \$217,000.

Canada : population, 3,575,577.—There are eight medical schools.

To matriculate, the applicant must pass an examination before a board, appointed annually, upon English grammar and composition, arithmetic, geometry, Latin, and botany, and also one of the following optional subjects, Greek, French, German, or natural philosophy. In the province of Quebec a knowledge of French is required. Those who have the degree of bachelor of arts are exempted from passing the above examination. The course of medical study extends over four years, with one session of six months in each year. In the province of Ontario a bachelor of arts is not required to devote more than three years to the study of medicine.

The course is as follows :

Two Sessions each of

| | |
|---|---|
| Descriptive and practical anatomy. | One session of medical jurisprudence. |
| Practice of medicine and clinical medicine. | One three months' course on— |
| Surgery and clinical surgery, | Botany. |
| Midwifery and gynaecology. | Hygiene. |
| Chemistry. | A course of microscopic anatomy, of physiology, and of pathology. |
| Materia medica and therapeutics. | Three sessions' attendance upon hospital clinics. |
| Physiology and pathology. | |

The examinations are held at the end of the third and fourth years upon the subjects of the course. Upon passing the final examination, the candidate receives the degree of doctor of medicine, or, as in some of the universities, the degree of bachelor of medicine, to be followed in a year or two by the doctorate. The title of M.D. does not confer the licence to practice. This can only be obtained from a board called the Provincial Board, appointed by the College of Physicians and Surgeons of Quebec or of Ontario. In the latter province, the candidate must pass an examination before the board. In the former, the licence is granted without examination to a graduate of any British University.

Chili : population, 2,200,000.—There is but one medical school. To matriculate, the applicant must have a diploma of a collegiate institute.

The course extends over six years, and is as follows :

FIRST YEAR.
Descriptive anatomy.
Inorganic chemistry.
Botany.

SECOND YEAR.
Descriptive anatomy.
Physiology.
Organic chemistry.

THIRD YEAR.
General pathology.
External pathology.
Pharmacy.

FOURTH YEAR.
External pathology.
Internal pathology.

FIFTH YEAR.
Medical and surgical clinics.
Practical classes.
Therapeutics and materia medica.
Hygiene.

SIXTH YEAR.
General clinics.
Obstetrics.
Diseases of women and children.
Legal medicine and toxicology.
Mental diseases.

Upon passing an examination in the above subjects, the candidate receives the degree of doctor of medicine with the right to practice.

The professors receive a salary of \$1000 annually. Those who are engaged in hospital duties receive \$1200.

Cuba: population, 1,000,000.—There is but one University, viz., Havana.

To matriculate as a student of medicine, the applicant must possess a degree in arts from some one of the government colleges.

During the first year (*ano de ampliacion*) the student attends lectures upon botany, zoölogy, physics, chemistry, and the rudiments of geology and mineralogy. He then enters upon the study of medicine proper, the course extending over six years, with examinations at the end of each year.

The curriculum is as follows:

First Year.—Descriptive anatomy and dissections.

Second Year.—Anatomy, physiology, and histology.

Third Year.—Therapeutics, materia medica, art of prescribing, pathology, surgical anatomy with operations.

Fourth Year.—External pathology, obstetrics, diseases of women and children, clinical medicine and surgery.

Fifth Year.—Internal pathology, clinical medicine and surgery.

Sixth Year.—Medical jurisprudence, clinical medicine and surgery.

Upon passing a theoretical and practical examination upon all the subjects of the course, the candidate receives the right to practice, with the title of Licentiate. To obtain the Doctorate, the licentiate must spend a year in studying the history of medicine and chemical analysis as applied to medicine, pass an examination upon any subject in medicine, and present and defend a thesis. Only doctors of medicine can aspire to hold a professorship; but other than this there are no privileges attaching to it.*

Denmark: population, 1,784,741.—The only medical school is connected with the University of Copenhagen. To matriculate, the applicant is required to present a certificate from a recognized literary institute, and must then attend a course of two years upon zoölogy, botany, physics, and chemistry, including analysis. After passing the examination upon these subjects, he is admitted to the course on medicine, which extends over five years. The candidate is obliged to pass a written examination upon medicine, surgery, and legal medicine; a practical examination upon surgery, medicine, operations, and dissections; and an oral examination, before the faculty and two censors appointed by the minister, upon anatomy, physiology, pharmacology, pathological anatomy, and general pathology, medicine, surgery, and obstetrics. These examinations are divided into two portions, with an interval between them of, at the most, one year. The degree of Doctor of Medicine, with the right to practice, is conferred after the above examinations. Attendance upon the lectures is not obligatory, the student being merely required to present a certificate of attendance upon the clinics before the final examination. The faculty consists of professors and teachers; the former receive a salary of from \$900 to \$1650, the latter of from \$650 to \$1450. These salaries are paid by the state, so that the faculty has no pecuniary interest in the size of the classes.

* We are informed that since the year 1872 the degree has been abandoned.

France: population, 36,100,000.—There are six Academies which confer the degree of Doctor of Medicine or of Surgery (Paris, Montpellier, Nancy, Lisle, Lyons, Bordeaux). There are also sixteen preparatory medical schools, where the diploma of health officer (*officier de santé*) only is given. The latter diploma enables the possessor to practice only in the department of France where it has been received. He is also forbidden to perform major surgical operations without the presence of a doctor. Accordingly, the great majority of medical students take the degree of Doctor of Medicine. Thus there are in France 14,718 doctors and only 5184 health officers.

To matriculate at a preparatory medical school, the applicant must present a "certificate of grammar," which shows some acquaintance with classical and modern languages, in addition to a thorough knowledge of history, geography, arithmetic, and the elements of geometry. The course extends over three years, and consists of lectures upon chemistry, zoölogy, anatomy, physiology, gynæcology, and the practice of medicine, surgery, and obstetrics. Two years of clinical work in the wards of a hospital are also required. A partial examination is held at the end of the first and second years, and a final one at the end of the third year, on all the subjects of the course. A thesis must also be presented. The candidate then receives the diploma of health officer.

To matriculate at an Academy, the applicant must have the degrees of Bachelor of Arts and of Bachelor of Sciences. The course extends over four years, of ten months in each year, and is arranged as follows (Academy of Paris):

| FIRST YEAR. | THIRD YEAR. |
|---|---|
| Medical physics. | Dissections. |
| Medical chemistry. | Surgery and surgical clinics. |
| Anatomy, with dissections. | Practice of medicine and medical clinics. |
| Zoölogy. | Didactic and practical obstetrics. |
| Physiology and histology. | |
| SECOND YEAR. | FOURTH YEAR. |
| Anatomy, with dissections. | Dissections. |
| Histology. | Practice of medicine. |
| Pathology. | Surgery. |
| Surgery and surgical clinics. | Obstetrics. |
| Physiology. | Legal medicine. |
| Practice of medicine and medical clinics. | Pathological anatomy. |
| | Materia medica and therapeutics. |
| | Hygiene. |

In addition, there are required practical laboratory work, and clinical work in connection with the hospitals, for two years. This may be done either the last two years of the course, or the last year and the year following. There is a partial examination at the end of each of the first three years; and, at the close, the final examination for the doctorate consists of five parts, including all the subjects of the course, together with the presentation of a thesis. The student's fees for the entire course amount to \$252. The professors receive a salary (equivalent to about \$1600 annually), and have no pecuniary interest whatever in the size of their classes.

German Empire: population, 41,060,695.—There are twenty-three Universities which confer the Doctorate. The staff of each school is made up of ordinary and extraordinary professors and of lecturers. The former only are

concerned in the administration of the colleges, which are supported by the government, although they possess an almost absolute autonomy.

To matriculate, the applicant must either present a "certificate of a gymnasium" or pass a preliminary examination upon Latin, Greek, German, history, mathematics, and the elements of natural science.

The course extends over four years, nine and one-half months in each year, and is as follows:

| | Number of Hours weekly. |
|--|------------------------------------|
| Chemistry | 6 for one year. |
| Physics | 4 " " " |
| Zoölogy and comparative anatomy | 3 " " " |
| Botany | 3 " " " |
| Mineralogy and geology | 2 " " " |
| Anatomy, histology, and preparation of specimens | 10 " " " |
| Physiology, with work in laboratory | 8 " " " |
| General pathology, pathological anatomy, with practical work | 6 " " " |
| Pharmacology, toxicology, prescription writing | 2 " " " or 4 for ½ year. |
| Special pathology, medical clinics, course on physical diagnosis | 10 " two years. |
| General and special surgery, clinics, bandaging, operating | 10 " one year, or 5 for two years. |
| Obstetrics and gynaecology, clinics | 3 " " " |
| Eye and ear clinics. Use of ophthalmoscope. Operations | 4 " " " |
| Forensic medicine | 2 " " " or 4 for ½ year. |

Examinations are held at the end of the second year (*tentamen physicum*) upon anatomy, physiology, chemistry, physics, botany, zoölogy, and mineralogy, and, at the end of the fourth year, upon the remaining subjects of the course. This latter examination precedes more or less closely (according to the proficiency of the candidate) the final examination, which is conducted by the faculty, each professor examining the candidate in his own department. After passing the examination and presenting a printed thesis, he receives the degree of Doctor of Medicine.

The right to practice, however, can only be obtained by passing the state examination, which is conducted by a board composed of the professors of the different colleges, appointed annually by the ministry. This examination is divided into five sections, and includes, besides a theoretical examination, the preparation and demonstration of specimens of the osseous, vascular, and nervous systems; the demonstration of an autopsy and a practical examination in medicine, surgery, obstetrics and gynaecology, physiology, and microscopy. It is not necessary that the applicant for the licence should be a doctor of medicine. In fact, the doctorate has no special privileges attached to it other than that it admits the possessor to examinations for official positions. As showing the severity with which the state examinations are conducted, it may be stated that in 1875-76, out of three hundred and seventy-eight applicants for the licence, only two hundred and ninety-two passed.

The professors receive fixed salaries, varying from \$800 to \$2400 annually, and increased every ten years by the addition of from \$100 to \$250; they also have the privilege of augmenting their income by giving private courses. The students' fees for the entire course vary in different schools from \$180 to \$260.

Great Britain: population, 32,412,010.—There are nineteen medical schools which confer the right to practice; ten, viz., the Universities, confer the doctorate; the remainder bestow the various titles of licentiate, member, and fellow. To matriculate, the applicant must either possess a degree in arts of some recognized collegiate institution or must pass a preliminary examination upon the following subjects: English grammar and composition, arithmetic, algebra, geometry, Latin translation and grammar, and upon one of the following optional subjects: Greek, French, German, or elementary mechanics.

The course extends over four years, each year comprising a winter session of six months, and a summer session of about three months, and is as follows:

| | |
|---|---------------------------------|
| Anatomy, with dissection | 2 winter sessions. |
| Physics | 2 " " |
| Chemistry | 6 months. |
| Practical chemistry | 3 " " |
| Materia medica | 3 " " |
| Practical pharmacy | 3 " " |
| Botany | 3 " " |
| Morbid anatomy, including post-mortem examinations | 6 " " |
| Practice of medicine | 2 winter sessions. |
| Surgery | 2 " " |
| Clinical medicine | 2 summer and 2 winter sessions. |
| Clinical surgery | 2 " " " |
| Midwifery | 3 months. |
| Diseases of women and children | 6 " " |
| Forensic medicine | 3 " " |
| Hospital clinics | 1 winter and 2 summer sessions. |

During the attendance at an hospital, the student must serve as clinical dresser for three months and as clinical clerk for three months.

The examinations are two in number, partly written and partly oral. The first, at the end of the second year, embraces chemistry, chemical physics, anatomy, physiology, materia medica, and pharmacy. The final examination, at the end of the fourth year, includes the remaining subjects of the course. The examinations are quite rigid, and are conducted by a board composed of professors and of others having no connection with the college. Excellence in one or more subjects is not allowed to compensate for failure in others. In 1875, of 2217 applicants for degrees, diplomas, or licence, 1743 passed.

Upon passing the above final examination the candidate receives the right to practice with the title (differing in different schools) of licentiate, member, fellow, bachelor of medicine, bachelor of medicine and master of surgery, or doctor of medicine. In Edinburgh the degree of M.D. is only to be obtained after first having taken the degree both of bachelor of medicine and master of surgery, and after having devoted two years to actual practice; no special examination is required, but the candidate must present a thesis. The higher titles, such as F.R.C.S. (Fellow of the Royal College of Surgeons), F.R.C.P. (Fellow of the Royal College of Physicians), and M.D. (Doctor of Medicine), have no privileges attached to them outside of the college granting them, excepting that they are requisite for appointment upon the staff of hospitals of any reputation.

The professors' salaries are derived entirely from the fees of the students, and thus depend directly upon the size of the classes.

Holland: population, 1,313,292.—There are three Universities (Leyden, Groningen, and Utrecht) which confer the doctorate, and an Athenæum at Amsterdam which confers no degree. The Universities are supported entirely by the state.

To matriculate at a university, the applicant must present a certificate from a gymnasium, or undergo an equivalent examination. The course extends over six years, including practical work in laboratories and in hospital wards. The examinations are held every two years upon the subjects of the preceding two years' lectures. After passing the final examination, and presenting a thesis, which is subject to debate, the candidate receives the degree of Doctor of Medicine. The right to practice is not, however, conveyed with this degree, but can be obtained only by passing an examination before a special board, consisting of eight professors appointed annually by the government.

The examination for the licence to practice may be passed either with or without the degree of M.D. If the applicant has not a certificate of a gymnasium, or the diploma of doctor of medicine, he must first pass a literary and philosophic examination. The subsequent examination (which must be passed by all) includes general and special pathology, pharmacology, morbid anatomy, medical jurisprudence, and clinical medicine, surgery, and obstetrics.

The professors receive a salary (equivalent to about \$960), and have no pecuniary interest in the number of students. The fees are quite large.

Italy: population, 28,526,000.—There are seventeen State Universities, four so-called Free Universities, and one Academy. To matriculate, the applicant must possess a certificate from a lyceum, which is a high grade of literary institute. The course of medical study extends over six years, of nine and a half months in each year (maximum number of hours thirty-six per week):

First Year.—Botany, physics, zoölogy, human anatomy, microscopy.

Second Year.—Chemistry, comparative anatomy, human anatomy, dissections, histology.

Third Year.—Human physiology, general pathology, materia medica and pharmacology.

Fourth Year.—Topographical anatomy, general medical and surgical pathology and clinics, pathological anatomy.

Fifth Year.—Practice of medicine and surgery, medical and surgical clinics, operative surgery, midwifery, and ophthalmology.

Sixth Year.—Mental diseases, medical jurisprudence, and clinics in medicine, surgery, obstetrics, dermatology, and syphilis.

There are three examinations, held at intervals of two years, by a commission composed of professors, with one or two associates having no connection whatever with the schools, and nominated by government. Excellence in one or more branches is not allowed to compensate for failure in others. Upon passing the second examination at the end of the fourth year, the student receives the title of licentiate, which is merely an academic distinction. The final examination at the end of the sixth year includes not only all the subjects of the entire course of study, but also the diagnosis and treatment of medical, surgical, and obstetric cases. Upon passing this examination, and presenting a thesis, the candidate receives the degree of doctor of medicine and surgery, with the right to practice. The faculty consists of ordinary and extraordinary

professors, the only difference between them being one of salary. The former receive according to seniority from \$1000 to \$1200 annually; the latter about \$600. The professors have no pecuniary interest in the size of the classes. The fees for the entire course are \$172.

Norway: population, 1,820,000.—The only medical school is connected with the University of Christiania. To matriculate as a student of medicine, the applicant must pass two preliminary examinations, one in arts, including Norwegian, Latin, Greek, French, German, English, mathematics, geography, and history; and one in philosophy, including geometry, zoölogy, botany, astronomy, and the elements of chemistry and physics. He then enters on the study of medicine proper, which on an average occupies six and three-quarters years.

There are three examinations, arranged as follows:

First examination, held two and one-half years after matriculation, upon anatomy, dissection, use of the microscope, histology, chemistry (organic and inorganic), zoölogy, and botany.

Second examination, held three and one-half years after the first, upon physics, pharmacology, toxicology, medicine, therapeutics, general pathology and pathological anatomy, surgery, ophthalmology, skin diseases, and syphilis.

Third examination, held about a year after the second, upon surgery and bandaging, topographical anatomy, obstetrics and gynæcology, diseases of children, forensic medicine, hygiene, and a practical examination in medicine and surgery. Thorough practical work in connection with the various hospital wards is also obligatory. Upon passing the above examinations, which are conducted by the faculty, the candidate receives the right to practice. The doctorate is a scientific degree, giving the right to lecture at the University, and can be obtained only by passing a very severe examination. As the fees connected with this special examination are also high, but few Norwegian physicians undergo it.

The professors receive a salary, beginning with \$1000 and gradually increasing to \$1900, the remuneration of each professor depending upon the length of time he has occupied the chair. As the graduates pay no fees, the faculty has no pecuniary interest in the number of students.

Portugal: population, 4,000,000.—There are three medical schools (Coimbra, Oporto, and Lisbon), all supported by the government. To matriculate, the applicant must pass an examination in Latin, Portuguese, French, English, mathematics, elementary physics, and chemistry, natural history, logic, history, and geography.

The course extends over five years of nine months each, and is as follows:

First Year.—Chemistry (organic and inorganic), physics, anatomy.

Second Year.—Zoölogy, physiology, anatomy, histology.

Third Year.—Botany, pharmacology, general pathology, clinical and operative surgery.

Fourth Year.—Special pathology, surgery, pathological anatomy, medical and surgical clinics.

Fifth Year.—Legal medicine, toxicology, hygiene, obstetrics and gynæcology, medical, surgical, and obstetrical clinics.

The examinations are held at the end of each year; after passing the final examination the candidate receives the degree of Licentiate, with the right to practice.

The doctorate is conferred upon the licentiate upon presentation of a thesis. The professors receive a salary of about \$800 annually, and are independent of the size of their classes.

Russia: population, 85,685,945.—There are eight medical schools in Russia,—namely, the Universities of Dorpat, Helsingfors, Moscow, Warsaw, Kieff, Charcow, Kazan, and the Medico-Chirurgical Academy of St. Petersburg.

To matriculate, the applicant must have a certificate from a gymnasium. The course of medical study extends over five years, with examinations at the end of each year. The arrangement of the course of study is similar to that in Germany. Upon passing the final examination upon all the subjects of the entire course, the candidate receives the right to practice, with the title of "Physician." To obtain the degree of Doctor of Medicine, he must have the above title, and undergo a written examination and also present a thesis. There was formerly a third degree, viz., Doctor of Medicine and Surgery, obtained after an examination in surgery, but this is fast becoming obsolete. The professors receive a salary of \$2400. The students pay for their tuition about \$40 yearly, excepting at the Academy of St. Petersburg, where the lectures are free.

Spain: population, 16,835,560.—There are three medical schools. To matriculate, the candidate must have the degree of doctor of philosophy. The course of medical study is four years, the student being required to take in addition the *ano de ampliacion*. The licence to practice is given, with the title of Licentiate, to the candidate upon his passing the final examination. The University of Madrid alone confers the doctorate.

The professors receive a fixed salary of \$600 annually, with the exception of at Madrid, where they receive from \$800 to \$1300.

Sweden: population, 4,500,000.—There are two Universities (Lund and Upsala), and one Academy (Stockholm), all of which confer the licence to practice.

To matriculate, the applicant must have a certificate from a gymnasium. Three years after matriculating the student is required to pass the medico-philosophical examination, which includes physics, chemistry, mathematics, botany, zoology, and comparative anatomy; three years later he must pass the examination for the academic degree of candidate in medicine, which includes anatomy, physiology, physiological chemistry, general pathology, pathological anatomy, and pharmacology; four years later he must pass a final examination upon practical medicine and surgery, obstetrics, ophthalmology, and medical jurisprudence. Upon passing the above examination, the candidate receives the right to practice. Attendance upon the lectures is not obligatory, but the student is obliged to attend clinics for at least one and one-half years. The course of medical studies is thus not less than ten years.

The degree of Doctor of Medicine is only granted by the Universities of

Lund and Upsala. The requirements are that the candidate must be a licentiate, and must present a thesis, subject to debate. The professors receive a fixed salary of from \$1120 to \$1400. As the students pay no fees whatever, the professors have no pecuniary interest in the size of the classes.

Venezuela: population, 1,800,000.—There are two Universities, viz., Caraccas and Merida. To matriculate, the applicant must possess the degree of Ph. B. (Bachelor of Philosophy), in order to obtain which he must have spent five years at least in the study of Latin, philosophy, logic, ideology, psychology, ethics, history, mathematics, and the physical sciences. Although the student may have taken this course at any university, the degree of Ph. B. is only to be obtained by passing an examination at one of the official institutions.

The course of medical study extends over six years. Examinations are held at definite intervals during the course upon the previous studies, and the successful students receive the titles successively of bachelor of medicine and licentiate. During some period of these eleven years he must also have studied and passed a creditable examination upon at least one modern language.

The final examination is strict, and is both theoretical and practical in character. It is conducted by a board of physicians called the Medical Faculty. The candidates who have passed this successfully receive the title of "physician" with the right to practice.

The doctorate is merely an honorary title, no examination being required to obtain it, and no privilege whatever being attached to it.

The professors receive a salary of \$50 a month. After having served for from fifteen to twenty years, and having published a work approved by the faculty, they are retired upon full salary, or are retained, if they so desire, at a salary of \$100 monthly.

ADDRESS

DELIVERED

OCTOBER 2, 1893.

*Members of the Board of Trustees and of the Medical Faculty of the
University of Pennsylvania: Students of the Medical School:
Friends of Higher Medical Education:*

How relative is our sense of the lapse of time! There are in the prosecution of every great enterprise single and repeated weeks, which days of sustained effort and sleepless nights of anxious thought make appear of well-nigh interminable length. And again, when from the summit of one important advance successfully achieved we look back to earlier heights attained, the elate spirit seems unconscious of time and space. So it is that some of us may feel who sat in this same hall this very day sixteen years ago. We were gathered to celebrate the establishment in the United States, upon a sound and permanent basis, of the advanced system of medical education of which the venerable University of Pennsylvania had been the earliest and the most consistent advocate. We came also to welcome the band of high-minded students whose selection of our higher and more exacting course of study proved their true vocation. As we sat here then we thought of Morgan and of Shippen, and of the lofty purpose which inspired them when they induced the trustees of the University of Pennsylvania to establish in 1765 the first medical school in North America.* We thought of the high standard at first maintained, and of how this was soon gradually and insidiously lowered through unwise competition and culpable neglect; and how after 1811 the debasement of

* The University of Lima, in Peru, was founded in 1551 by Charles V., and in 1553 the University of Mexico. It is not known that instruction in medicine began to be given until a little prior to 1700. In 1707 we learn that there was great complaint in the University of Mexico of the want of a cadaver to read lessons of anatomy over.

medical education went on more rapidly and recklessly. We thought also of that bitter experience of 1846, when, in accordance with the earnest recommendation of the American Medical Association, the University of Pennsylvania bravely extended her term of study, only to find that, in spite of their specious assurances, not a single one of her rivals emulated her courage; so that after six discouraging years of steadily-diminishing classes she sorrowfully abandoned her advanced position. We thought, too, alas! of the long and painful controversy, lasting almost five years, over the proposition to again elevate our standard of medical education, and of how the end had been attained only at the cost of old friendships and of the allegiance of valued associates whose convictions remained unchanged as to the injury that would be worked to the University by the proposed advance. It is with no intention of dwelling upon the unhappy state of medical education and of the medical profession prior to 1877 that I have made these allusions. More than enough was said on this subject in the address I had the honor of delivering on that occasion.* Nor do I refer to the earnest opposition the proposed changes then encountered, save to contrast it with the ready acquiescence now experienced by proposals of further and even greater advance. But all of these events and feelings now recur with such vividness to the minds of those of us who were actors in that critical period of American medical history, that it seems incredible that sixteen long years of struggle have intervened between that day and the present. It is, then, to the story of these years, so far as concerns the progress of medical education, and to the details of the plan which goes into actual operation to-day, that I invite your attention. Nor do I fear any criticism in addressing myself especially to the experience and to the present position of the Medical School of the University of Pennsylvania, because it is to her historic prestige and to the ardent loyalty of the great army of her graduates, and not to the work nor the fame of the present Faculty, that is due the fact that her progressive action and its brilliant results did in 1877, and again have done in 1891, more than aught else to decide the fate of higher medical education in America.

The most important reforms aimed at in the changes of 1877 were as follows:†

1. The establishment of a preparatory examination.

* Higher Medical Education, the True Interest of the Public and of the Profession, 1877.

† Pepper, *id. loc.*, p. 25. [See p. 35, *ante.*]

2. The lengthening of the period of collegiate studies to at least three full years.
3. The careful grading of the courses.
4. The introduction of ample practical instruction of each student both at the bedside and in laboratories.
5. The establishment of fixed salaries for the professors, so that they might no longer have any pecuniary interest in the size of their classes.

So familiar have the profession and the public become with the value of thorough medical education, that it will scarcely be believed that fifteen years ago it was the general custom with the medical schools of the United States to grant a diploma, conveying the full right to practice medicine, to applicants who had been admitted without preliminary examination, and had attended without term examinations two courses of lectures covering about five months each, and had passed a single and final examination conducted by their own teachers, whose emoluments were derived solely from the fees of such students.

Let us note somewhat carefully each one of these grave defects, and how they have been corrected. It will not be doubted by any one that it is the solemn duty of those engaged in the conduct of medical education to see to it that before a student is permitted to enter upon the study he has shown proper aptitude and has already acquired certain fundamental knowledge. It avails nothing to point to the rare illustrious men who have leaped at a few bounds from the ploughshare to the front rank of scientific or judicial eminence, and who have served immemorially as instances to support the fallacies of those who from selfish motives or from ignorant prejudice decry thorough education. Let not the rest of us, only ordinary sons of toil, be misled by the hope of such exceptional careers.

Long experience shows that the future success of the physician is largely influenced by his preliminary training. The adoption of the profession of medicine is not a choice to be made lightly. It is a hardship to students who have been admitted without examination to be dismissed after two or three years because their teachers are not able to supply the fatal defects of early study. It is a more cruel hardship to the community to have turned loose upon them ill-trained physicians, literally wolves with sheep-skin clothing, who by cramming or coaxing, or the cupidity of examiners whose fees will be affected by the result of the examination, have acquired an unmerited diploma.

Yet here, as elsewhere in education, those who desire progress must have a regard for actual conditions and practical possibilities. When the University of Pennsylvania advanced her standard in 1877 it would have been an injury to the community had the possession of a college degree or an equivalent preparation been fixed as the condition for admission. The example of Harvard and ourselves demonstrated so forcibly the possibility of establishing moderate preliminary examinations that by 1891, out of one hundred and forty-eight medical schools in the United States and Canada, no fewer than one hundred and twenty-nine had adopted some standard of general qualifications. In most cases, it must be admitted, these preliminary examinations are too low in their exactions and too lax in their enforcement. None the less they have served a good purpose until the development of our colleges and high schools has enabled a wiser order to be established.

The past fifteen years have seen rapid changes in the college system of this country. The battle between the classics and the natural sciences has waged fiercely, and happily both have come out victors. No one here now questions the admission into the college curriculum of the group of biological studies, such as botany and zoölogy and comparative anatomy, any more than we question the importance of maintaining the highest and most thorough training in the classics for those who desire to pursue their study.

But while the college course has for some years been growing more liberal, and while more numerous elective studies have been permitted, it is only recently that we have recognized that its development must be adapted to the requirements of the higher University schools. The standard of requirement for the B. A. degree, and, consequently, that also for entrance to college, were advanced so rapidly that the preparatory schools could not at once adapt themselves to the new order of things. An unreasonable and undesirable increase in the average age of admission to college followed. To acquire the B. A. degree at twenty-two or twenty-three years, and subsequently the degree in law or in medicine only at twenty-six or twenty-seven years, is to unduly postpone entering on practical life. The natural consequence followed, and the medical schools which provided the longest and best courses, and which most earnestly desired the best preliminary training on the part of their students, found that the proportion of those who held degrees from colleges or scientific schools began to fall off. The difficulty is but a temporary one. The educational systems of Germany and of Austria and of France prove that it is possible to secure liberal

training in letters or in science, followed by thorough professional study, and yet so arranged as to permit the student to enter all branches of professional life, or the higher employments of the State, by the age of twenty-four or twenty-five years. So with us the school and college systems will rapidly become more uniform, and it will be recognized that the B. A. degree should be obtainable on an average at the age of twenty years, leaving for post-graduate courses the more highly specialized work, whether in letters, in science, or in pedagogy, which is as truly professional as the courses in medicine, in law, or in theology. We may, however, confidently look forward to the time as near at hand when the leading schools of medicine will exact, as the requirement for admission, the possession of a degree from a college or scientific school which has provided adequate instruction in natural science and in biology, or the evidence by examination that the candidate possesses an equivalent preparation.* The University of Pennsylvania has the honor of having established the first thoroughly-equipped school of biology in this country. Founded chiefly by the generous gifts and scientific labor of Horace Jayne, it has connected with it the great names of Rothrock, of Allen, of Cope, of Billings, and of the immortal Leidy, who lives with us through his undying influence and fame, as truly as though again in the flesh. In the arrangements for the prolonged and elevated curriculum of the medical school, which goes into effect to-day, full recognition has been made of the great value of biological studies as a training for, and indeed a component part of, medical education. It was desired not only to enable our own college students to profit by the unequalled advantages of our biological school, but to encourage and incite, by the inducements held out, other colleges to establish similar courses in biology. It is consequently provided, first, that students who have satisfactorily pursued the last two years of the Natural History Course in the College Department of the University of Pennsylvania will be exempted from the preliminary medical examination; and, secondly, the important announcement is made that college graduates in arts or in science of this and other approved institutions, who during their course have devoted to chemico-biological studies a total of twelve hundred and forty-eight college hours,† may be admitted to the second year of the medical course without

* Johns Hopkins University opens its Medical School to-day, and the requirements for admission are as here defined.

† For table giving list of studies, see College Catalogue, 1893-94.

an entrance examination. It is with deep gratification that I learn from Dean Marshall that already in this first year a considerable number of students, representing widely distant colleges, have been admitted to our second year under the operation of this provision, thus demonstrating its admirable influence.

Let us not, however, rest content with what we have accomplished: let us remember, even in this hour of abundant satisfaction, that the condition of progress is the state of perpetual discontent, and let us pledge ourselves to institute further and more advanced requirements for admission as soon as the educational development of the country renders this step judicious.

It is indeed clear that unless this be done, even the considerable prolongation of the curriculum we have effected, would soon show itself insufficient. It will be remembered that one of the worst defects of the former, and now discredited system of medical education, was the ridiculously short period of study required. Before Harvard and the University of Pennsylvania made the first advance and demanded three years of actual attendance on the part of the student, it is literally true that, at most colleges, medical students were required to attend only two courses of lectures, each of less than five months' duration, giving only one hundred and fifteen to one hundred and twenty-two days of actual instruction. Specious phrases were then generally, as they still are occasionally, used in reference to a third year of study in a preceptor's office. But the profession and the public have learned that, the element of human nature entering freely into the composition of medical teachers and medical students, no reliance can be placed upon expectations that any arduous or tedious work will be done that is not specifically insisted upon and critically supervised.

I have already spoken of the importance, of the vital necessity, of proper preliminary education. I have spoken of its limitations as to time, and have indicated the importance of including biology in its curriculum. It is not necessary to point out that a course of medical study, in its proper form, is really a continuation of a liberal education. But it must be remembered clearly that it is more than a course of study: it is at the same time the acquisition of an art. So difficult, indeed, is this art, so delicate are the phenomena the student must learn to recognize accurately, that to secure good results and safe equipment, not only must the earlier studies have trained the senses, and especially those of sight and of touch, but long years must be spent in the laboratories of the school and in the wards of the hospital. Note carefully that medical education

no longer does consist, and never should have consisted, in the reading by the professor of systematic courses of lectures to bodies of students which might number two thousand as well as two hundred. A certain amount of such systematic instruction is retained, and we hold that it answers a useful purpose. But the broad basis of modern medical education is the careful training of the individual student at the bedside and in the laboratory.

Medical science waited thousands of years for the discovery of instruments of precision. Sydenham scarcely advanced beyond the point reached by Hippocrates. The centuries between these great observers afflict us with the view of great learning and ceaseless effort lost in the mazes of fruitless speculation. The microscope, organic chemistry, the clinical thermometer, the ophthalmoscope, the scientific study of the pulse, the blood, the urine; auscultation and percussion: these are the marvellous aids of modern medicine by which the secrets of disease are being surely disclosed, and the rules of preventive and curative medicine surely established. To learn to use these precise methods and these instruments of precision is a slow process; and still slower is the acquisition of a practical knowledge of disease—of its varied physiognomy and the puzzling habits it may wear; of the subtle signs by which the contending forces of the system and of the malady show themselves, and supply indications for our efforts at relief, and guide us in estimating the probable issue of the struggle. To obtain this, one must begin while yet a student to live the medical life, to breathe its atmosphere, and to be in daily contact with the details of the art. Not two years of five months, not three of six months, but at least four years of eight months of actual attendance and constant residence are imperatively demanded. So that it is a matter of rejoicing that, when the present advance was decided upon, and announced by the medical faculty of the University, on November 25, 1891, it was subsequently ordered that the length of each session should be increased to the full extent of the academic year.

It must not be supposed that either the advance of 1877, or that of 1891, has been made without great effort and sacrifice. The power of State legislatures and of courts to grant charters and degree-conferring privileges, has been extended recklessly to new institutions, which are often poisonous mushrooms springing up in the rank soil of selfish interests. Nowhere has this been so conspicuous as in the case of medical schools; and calamitous indeed have been the results to the community. The unscrupulous competition for students between these schools, whose numbers are

grotesquely excessive in proportion to the population and needs of the country, has been the chief cause of that degradation of medical education which we have had such reason to deplore. In 1877 I showed* that while in countries so dissimilar as Brazil and France, there was an average of one medical school to 6,000,000 inhabitants, and in Germany or Great Britain, of one to 1,750,000, the proportion in the United States then stood one to 477,392. I wish it were possible to say that the exposure of this state of things, and the loud protests from physicians and laymen against the wanton multiplication of medical schools, had been productive of any effect in checking the evil. On the contrary, this morbid process has gone on more virulently than ever; and in the twelve years, from 1878 to 1889 inclusive, no fewer than sixty new medical schools were chartered. Fortunately, as with all other hastily begotten and imperfectly vitalized organisms, our new medical schools are apt to be short-lived. It is probable that, first and last, there have been established in the United States as many as two hundred and sixty medical schools; but at present I am happy to state that I have been able, after protracted and earnest efforts through correspondence conducted by my efficient associate, Dr. Burr, to demonstrate the existence of only one hundred and forty, a number sufficient, however, to keep the proportion of school to population up to one to 440,150. (See Tables I., II., III., IV., and V., *post.*) Astonishing as has been the growth of population in the United States during the past few decades, it is impossible to avoid the reflection as to the proportions this increase might have attained had it not been for the restraining influence exerted by the brood of physicians, unqualified in all save the licence to practice, who have been spawned upon the public by the more unworthy of these institutions.

That there is nothing in the recent changes in the methods of medical education to justify such continued creation of medical schools is shown conclusively by a table I have prepared, from which it is seen that in other countries, almost without an exception, the number of inhabitants for each medical school is greater now than it was in 1877. Nor can it longer be maintained that it is the sparsely-settled state of our territory that explains and justifies the prodigious number of our medical schools. In Brazil there is now but one medical school for every 7,001,167 inhabitants; and in Russia, but one for every 14,403,317; while in New York State, with 6,000,000 population, there are fourteen medical schools, or

* Id. loc., Tables II. and V., p. 35. [See p. 46, *ante.*]

one for every 428,418; in Missouri, with 2,679,184 population, there are thirteen, or one to every 206,091; and in that vigorous community of Ohio, numbering 3,672,316, there are, I believe, in actual existence, no less than nineteen medical schools, or one to every 193,279.

It is true that many of these schools have but small numbers of students in attendance. (See Tables VI. and VII., *post.*) In each of thirty-nine schools there were in 1888-89 less than fifty students altogether. It would be well if this circumstance evidenced a heroic devotion to medical science on the part of its faculty rather than an appreciation of the personal advantages to be derived from the notoriety attaching to any professorial position. But at least the statistics justify the inference that the most is made of the few students, by admitting all of them to graduation; a course which my tender regard for medical students compels me to admire, but which candor forces me to admit is not emulated here, since about one-third of the matriculates in the medical school of the University of Pennsylvania fail to comply with the standard of requirements here maintained, and to attain to the justly coveted diploma.

Heaven forbid that, proud of the position won by this University after a century and a half of effort, I should seem to speak in levity or in scorn of sister institutions of more recent birth, or of less dignity. I believe firmly that the conditions of this country do demand a larger proportion of collegiate, and probably of medical, institutions than seems to be required elsewhere; and I know well and respect warmly the admirable work that is done in very many of the smaller colleges in various parts of the country. But what the community is coming to deprecate is the deliberate establishment of new medical schools in unsuitable localities, either by educational institutions which merely wish to continue their hold over their students, or by little groups of medical men who merely wish to promote their personal interests. There are branches of study, like Greek or mathematics, which may be studied as well, granted a true teacher and the necessary books, in a small village as in a metropolis. But no excellence on the part of the teacher can atone to the student of mechanical engineering for the want of the fully-equipped plant; and still less to the student of medicine for the want of the extensive and varied experience with all forms of disease and injury only to be acquired in the hospitals and dispensaries of a great city. Nor is it without importance, for both the public and the profession, that side by side with this obvious evil of excessively numerous medical schools comes the inseparable

but more insidious danger of pauperizing the community by a superabundance of free medical service. Each medical school inevitably desires the most liberal use of hospital and dispensary facilities as attractions to draw students, and as a basis for practical instruction; and when, as is so common among us, these schools are in excess of the needs of the community, or are in towns too small for the purpose, the eager desire for ample clinical material is gratified at the expense of the local profession, and of the self-respect of a considerable portion of the community.

Fortunately the increasing endowments and constantly-improving equipment of our great medical schools are drawing with more and more certainty the larger and better portion of the student class, and this will go on with growing rapidity until the day of small and ill-equipped schools shall be numbered as of the past. But even when we speak of such a medical school as this, connected with one of the oldest and greatest universities in America, whose advantages and whose services to medical science seem to entitle her to the success with which she is favored, even then it seems to me that the members of its medical faculty owe a paramount duty to the profession as well as to their students. This duty should take the form of regarding their privileged position as a trust; not as designed for their private emolument, but to enable them to promote more liberally and effectually every movement for the advancement of education and of science. Surely there is found in this spirit of devotion and in this recognition of a higher law, one of the principal sources of the evident truth that in America, as in other countries, the greatest medical schools will be found in connection with the great universities. Nowhere, as I firmly believe, can bodies of men be found more profoundly penetrated by the spirit of loyalty to a great cause, of scorn for venality, and of subordination of selfish interest to the advancement and diffusion of science than in our university faculties. Happy are those who find their bosom fired with fine ambition to play their part in this great university movement, whether called on to fill more conspicuous positions as teachers, or to do scarce less important work among the body of alumni upon whose widespread and sustaining influence the success of every forward movement must ultimately depend.

It always seems, when year after year we gather to hear the record of work done, or to consider the plans for future effort, as though the very air around us were thick with the shades of our illustrious colleagues, who, after fighting bravely the good fight, rest from their labors. But their good deeds do indeed follow them, and

upon us, their successors, however unworthy we may be, fall their benediction and a double portion of their spirit of loyalty and devotion to truth and to Alma Mater.

I said that both the advances of 1877 and of 1891 had been made possible only by the willingness of the medical faculty to incur considerable loss if necessary. It is evident that the greedy competition for students, the attractions to the average man of cheap and easy courses, the inevitable increase in the expense of maintaining the more advanced system of education, all justified grave anxiety as to the result. In 1877 it was deemed unwise to make the change without substantial guarantees against deficit, covering five years. A list of the subsequent entering classes will show you that this fear proved unfounded, and that the movement was, almost from the first, a complete success. As a matter of fact not one dollar of the guarantee fund was ever required; so that, as it seemed difficult to imagine that any one would sign a guarantee to the University without really expecting and intending to liquidate for the full amount, a request was made to the guarantors, and they, without exception, agreed to devote their respective sums to the erection of the fine laboratory building which was essential for the work of the dental no less than the medical department.

It is with the same cordial pleasure that I feel myself able to say that the great advance recently made in dental education, in accordance with the action of the Association of Dental Faculties in 1889, has resulted in most gratifying success. It is indeed difficult to point to any branch of education in which more rapid and substantial progress has been recently made than in this. Only a few years since, the grade of dental education was so low that practitioners of dentistry were viewed with distrust as utterly unworthy to be considered, what they undoubtedly are, as practising an important branch of medicine. The organization of the National Association of Dental Faculties in 1889 was the turning-point in the history of dental education in America; and the loyal obedience paid by the faculties to the high-principled policy of this association has been honorable in the extreme, and has borne the happiest fruits. The decision that, beginning with the session of 1891-92, attendance upon three full regular courses of not less than five months each, in separate years, shall be required before examination for graduation, naturally affected at first the attendance of students, especially at those schools where, as here, it was known that the new and higher standard would be rigorously enforced. But, just as has been shown in the history of our veterinary department; just as has happened

with the recent important advance in the standard of our law department; so, too, in the case of the dental department has the law proved invariable that the best teaching and the best equipment will inevitably attract the largest number of the best students.

The honorable and courageous course of the leaders of the dental profession has amply justified the confidence shown by Harvard, the University of Michigan and the University of Pennsylvania, who were pioneers in the academic recognition of dental education. We may to-day congratulate ourselves that the future of this important branch of medical education is upon a basis of assured and dignified success.

The fundamental reasons for the lengthening of the curriculum in each of these professional schools are essentially the same. The increased time is demanded for the careful grading of the courses and for the introduction of the ample practical instruction of each individual student. It is the general recognition of the importance of these features, and it is the honest thoroughness with which they have been carried out in the professional schools of this University, which has rendered so successful all our previous advances and which has justified the last great movement which we are assembled to-day to inaugurate. It was not long after the successful establishment of the three years' course that it began to grow evident that an additional year, and a longer session in each year, were immediately required. (See Table VII., *post.*) Just so soon as the immense advantages of the new methods of clinical and laboratory teaching were manifest, so much time was demanded for them, and so many practical subjects of great importance claimed recognition, that the three-year course was as much overcrowded as had formerly been the two short sessions with their meagre curriculum. The ideal of our future course was readily formed; the lines of progress were clearly indicated. The students are to present themselves with better qualifications, especially in the line of biological studies. The first two years are to be occupied with the fundamental studies of anatomy, chemistry, and physiology, taught with admirable thoroughness, and with the largest reliance on practical laboratory work. In the last two years the great practical subjects of medicine, surgery, and obstetrics, with the leading special branches, such as gynæcology and ophthalmology, are to be taught both by didactic lecture and by clinical demonstration. Throughout the entire curriculum clinical opportunities are to be afforded, beginning with the restricted attendance on general clinics in the first year, and advancing to more and more extensive and personal

work, both in general and special subjects, until the fourth year is reached, the practical advantages of which are such that it may be considered as almost the equivalent of a year of hospital residence. Each student shall be trained individually in the great art of physical diagnosis through three full years, and in the actual use of all the methods of precise study of disease. His faculties shall be educated, and his senses and power of observation trained to acuteness and accuracy. Such a course will speedily develop the special gifts of each individual, and provision is to be made that at the beginning of the fourth year each student shall elect a certain number of special branches for which he has acquired unusual taste or aptitude, and in these he is to be supplied with the largest opportunities for advanced practical work.

It requires no labored demonstration to show that this extended and graded course will exert a fine educational effect upon every faithful student; and will equip him for his professional work with a completeness never before obtainable on this continent. Such medical men will be indeed worthy of and will receive the fullest confidence of the community. They will be fitted to take a leading part in the vast struggle upon which we have entered—no longer only against individual cases of disease, but against the numerous and widely diffused causes which induce disease. The medicine of the future is the medicine of prevention; and it is to the alliance of medicine with hygiene, and to the aid they will derive from the subtlest methods of investigation that the human race is to look for the attainment of such splendor of health and physical development as was not even dreamed of by the Greek in the palmyest day of his supremacy. Close by this hall of medical science has been reared by the wisdom and the munificence of one* long and honorably connected with the profession, though himself no physician, the most completely equipped laboratory of hygiene in America; and in accordance with the conditions of the foundation every student of medicine in the University is to be carefully instructed in this most important of all medical subjects. Investigations are being conducted there, such as have led to the marvellous and epoch-making discoveries of Pasteur, of Koch, and of Lister. There will be trained men who will be called to the councils of our States, and even of the nation, to aid in the exclusion and in the extermination of preventable disease. It is in such retreats that true medical science, far removed from the strife of sects or the way-

* Henry C. Lea, Esq.

ward passions of the day, sits calm-eyed and serene, pondering the great problems of life, of disease, of death. The world has come to recognize the grandeur of her achievements. The nations look on in admiring dread, while with unerring finger she points out at the very portals the microscopic cause of horrible infections, and orders the protective measures which baffle the invader. When a single discovery can so surely affect the health of nations, and influence their commercial prosperity, it should have ceased to be necessary to plead for the endowment of original research and for the most liberal advances in medical education.

Every inducement will be offered here to students who have shown special ability to remain for post-graduate work in such fields of original investigation. Thanks to the princely generosity of another friend of higher medical education, the descendant of one who long ago filled* with the highest distinction the chair of anatomy in this medical school, there has been erected the splendid building which will contain the Wistar Museum and Institute of Anatomy, in which facilities for advanced study, unknown elsewhere, will be available.

It is surely unnecessary to say more to explain the joy the trustees and the faculties and the alumni of the University feel to-day at the thought that this ideal, which a few years ago seemed so remote, is fully realized. But it is only fair to show briefly that the courage to take this further, and for many years in all probability this final step, has been derived not only from an abstract study of what medical education should be, but from a close observation of what has been accomplished by those graduates who, entering the University in 1877 and subsequently, have profited by the substantial improvements then effected. I remember that some five and twenty years ago Sir James Paget gave† a short account of the careers of one thousand medical students who had attended his lectures during a period of twenty years. This period closed ten years before the date of the inquiry, so that all the graduates had enjoyed the benefit of at least ten years of medical work. "It is said," begins Paget, "that Abernethy, on entering the anatomical theatre for one of his introductory lectures, looked around at the crowd of pupils and exclaimed, as if with painful doubt, 'God help you all! what will become of you.'" I shall not give you the

* Dr. Caspar Wistar, Professor of Anatomy, 1789 to 1818; the Wistar Institute has been founded by his lineal descendant, General Isaac J. Wistar.

† St. Bartholomew Hosp. Rep., Vol. V., 1869, p. 238.

details of Paget's results. They seem to indicate a very encouraging degree of success, so that I was led to inquire how it has fared with those of our graduates who have left us since 1879. I may say that while the replies from almost eight hundred out of the number addressed show that each class has reached what must be regarded as a highly gratifying average of professional income, I prefer to wait before publishing the results until the returns are still more complete. No less gratifying is it to learn that no fewer than six hundred out of a total of eighteen hundred and thirty-four graduates had secured appointments as resident physicians, the large majority of the positions being won in competitive examinations. Forty-four have already been elected to professorships in medical schools, twenty-nine are lecturers, and forty-eight are assistants. Now, when we reflect upon the large proportion who settle in small towns or rural districts, and also consider how recent is the period I have chosen for inquiry, you will agree with me as to the astonishingly large figures I have quoted. They show quite clearly that our graduates have been so much better equipped than the graduates of most other schools, and that there is such a general recognition of this fact, that the lion's share of important vacancies falls to our men.

You know that we are very proud here of our historic connection with the University of Edinburgh, and certainly we have always striven to maintain the same scientific thoroughness, and likewise the same eminently practical character of teaching which have so long enabled that great school to hold its position of commanding influence and prosperity. Well, the gratifying experience of our recent graduates reminds me of a story that is told by my friend John Chiene, the eminent professor of surgery in the University of Edinburgh. Professor Chiene says: "I was on a visit to London, where I met a famous Southern teacher of medicine. He asked, 'What are *you* doing here?' I answered him, according to Scottish use and wont, 'Why do you ask?' He said, 'I fear you Scots; you are always up to some mischief. There is a vacancy in — [mentioning a well-known school of medicine]. There are six candidates for the place; four are Scotchmen, the fifth is an Englishman educated in Scotland, the sixth bears the name of MacGregor.'" We may confidently expect that the still more complete and practical education received under the system now inaugurated will enable our graduates to maintain the happy reputation they have established.

If the present great advance were in any sense experimental, if its success could for a single moment be doubted, it would be a

source of deep concern. Many causes combine to dispel any such apprehension. In the first place, the trustees have again prudently exacted the condition that before the new curriculum should go into actual operation a considerable guarantee fund (\$20,000 annually for five years) should be secured; and in addition to this a large amount was subscribed to the endowment fund of the medical school. The members of the medical faculty showed on this occasion, as in 1877, an enthusiastic liberality which went far to meet the conditions imposed. Moreover, in full appreciation of the importance of relieving the teaching body of all taint of suspicion as to partiality owing to direct personal interest in the profits of the school, they have favored the adoption by the trustees of an agreement by which all surplus receipts, after the payment of stipulated salaries, shall be divided into three parts, of which one shall go to the general funds of the University, one to the endowment of the medical school, and only the remaining third shall be distributed equally among all members of the faculty. Such conduct was the more honorable on their part as they had already entered on a more costly and exacting system of instruction, which must surely increase greatly the expenses of the department, and, for a time at least, reduce the number of students in attendance.

No less honorable has been the part taken by the medical faculty of the University in aiding the enactment of the law which created in this year a State Board of Medical Examiners for Pennsylvania. Opinions may differ honestly as to the details of this law, and there may be points in which it will require amendment; but it is part of the traditions of the University that in 1806 a petition from its medical faculty was laid before the legislature requesting that a law be passed which should prevent the practice of medicine by ignorant persons who had not graduated from some university or college. From that day to this the influence of the University of Pennsylvania has been exerted in favor of higher requirements for graduation and of every restriction which can be thrown around the practice of medicine with the honest purpose of safeguarding the health and life of the community from ignorant or designing persons. It is an unquestionable triumph of the right, and therefore it must redound to the interest of every institution whose sole aim is to do right in this weighty matter of medical education, to find that within a very few years there have been established in the thirty-four States or Territories about which I have been able to secure information on this point State examinations of all applying for licence to practice in thirteen, State exami-

nations or official registration of diploma in twelve, and registration of diploma alone in nine.

I have told you at great length the story of the recent changes in medical education; of the way in which we have tried to secure the reforms recognized as necessary, and of the admirable results already secured in the increased renown and prosperity brought to the University, and in the gratifying success and position of our graduates. When we reflect that not at the University of Pennsylvania alone, to which I have limited my remarks, but in many other institutions, the same righteous effort for sound learning and higher education is being made and is meeting with a like encouraging appreciation, it is a proud thought that in this Columbian year we may invite attention, not only to our vast material prosperity, but to the splendid development of our educational resources; to the rapid elevation of our standards, and to the pure intellectual life so strongly fostered at many great centres as it is in this venerable University.

We have stood on that bridge which spans the lagoon in Jackson Park and have realized, as we gazed to the right, to the left, or ahead through the stately peristyle to the great lake beyond, that we were surrounded by such triumphs of art as not even Athens, in the golden age of Pericles and Phidias, could display. That one scene will pass, its purpose having been effected; but the impression it has produced will never pass away. It has introduced a new standard; it has furnished a new inspiration; it has shown the astonished world that the fifth act of the world's great drama of empire, as sung by Berkeley, opens on no sordid scene, but on one where noble ideals and noble opportunities await Time's noblest offspring. And to us who labor here in the departments of this great University, consecrated by the memories of the good and the wise who have lived here, consecrated also by the thousands of pure, high-minded youth who throng her halls, to us this year more clearly than before a vision arises of what she shall come to be, a vision as of temples not built with hands, where Truth shall dwell forever, and from whose glittering portals shall go out to all parts of the world Knowledge for the healing of the nations.

POSTSCRIPT.

As this book goes through the press, I am able to give figures which show the gratifying results of the establishment of the compulsory four-years course with prolonged sessions.

SESSION OF 1893-94.

| | |
|---|-----|
| Special students | 3 |
| Students of the voluntary fourth year class | 6 |
| Students of the third year class | 274 |
| Students of the second year class (the last admitted under three-year rule) | 325 |
| Students of the first year class (the first class entering under four-year rule) | 188 |
| | 796 |

SESSION OF 1894-95.

| | |
|--|-----|
| Special students | 3 |
| Students of the third year class | 342 |
| Students of the second year class | 185 |
| Students of the first year class (the second class entering under four-year rule) | 242 |
| | 772 |

The maintenance or augmentation of the six of the upper classes is due to the numerous admissions to advanced standing, which exceed the considerable number of students dropped from each class for failure to comply with the term-examinations.

APPENDIX II.

TABLE I.

| COUNTRY. | Population. | Number of physicians. | Proportion of physicians to population. | Graduates. | Number of medical schools. | Proportion of schools to population. |
|-----------------------------------|-------------|-----------------------|---|------------|----------------------------|--------------------------------------|
| Austro-Hungarian Empire | 41,231,342 | 10,690 | 1 to 3,857 | ... | 8 | 1 to 5,153,917 |
| Belgium | 6,136,444 | 2,160 | 1 : 2,841 | ... | 4 | 1 : 1,534,111 |
| Brazil | 14,002,335 | ..... | ..... | ... | 2 | 1 : 7,001,167 |
| Canada | 4,324,810 | ..... | ..... | ... | 13 | 1 : 3,326,877 |
| Chili | 2,817,552 | ..... | ..... | ... | 1 | 1 : 2,817,552 |
| France | 38,343,139 | 16,593* | 1 : 2,666 | ... | 7 | 1 : 5,477,591 |
| German Empire | 49,428,470 | 16,270 | 1 : 3,038 | ... | 20 | 1 : 2,471,923 |
| Great Britain | 37,740,285 | 22,105 | 1 : 1,707 | ... | 16† | 1 : 2,358,767 |
| Italy | 30,347,291 | 8,580 | 1 : 3,536 | ... | 21 | 1 : 1,445,109 |
| Netherlands | 4,621,744 | 1,860 | 1 : 2,484 | 25 | 7† | 1 : 660,249 |
| Norway | 1,988,771 | 502 | 1 : 3,961 | ... | 1 | 1 : 1,988,771 |
| Sweden | 4,802,751 | ..... | ..... | ... | 3 | 1 : 1,600,917 |
| Russia | 115,226,542 | 13,475 | 1 : 8,551 | ... | 8 | 1 : 14,403,317 |
| Spain | 17,550,246 | 5,200 | 1 : 3,375 | ... | 9 | 1 : 1,950,027 |
| United States | 62,622,250 | 100,000 | ..... | ... | 140 | 1 : 440,151 |

* Including officers of health.

† The amount of medical instruction given in hospitals is so great that the number of medical schools is really greater than here stated.

‡ Only four give degrees.

TABLE II.

Table showing Number of Medical Schools in each State; Population and Proportion of Schools to Population.

| STATE. | Population as given in census of 1890. | Number of schools. | Proportion of schools to population. |
|---------------------------------|--|--------------------------|--|
| Alabama | 1,513,017 | 1 | 1 to 1,513,017 |
| Arkansas | 1,128,179 | 1 | 1 : 1,128,179 |
| California | 1,208,130 | 5 | 1 : 241,626 |
| Carolina, North | 1,617,947 | 1 | 1 : 1,617,947 |
| Carolina, South | 1,151,149 | 1 | 1 : 1,151,149 |
| Colorado | 412,198 | 3 | 1 : 137,399 |
| Columbia, District of | 230,392 | 4 | 1 : 57,598 |
| Connecticut | 746,258 | 1 | 1 : 746,258 |
| Delaware | 163,493 | ... | ..... |
| Florida | 391,422 | ... | ..... |
| Georgia | 1,837,353 | 5 | 1 : 367,470 |
| Illinois | 3,826,351 | 9 | 1 : 425,190 |
| Indiana | 2,192,404 | 6 | 1 : 365,400 |
| Iowa | 1,911,896 | 5 | 1 : 382,579 |
| Kansas | 1,427,096 | 2 | 1 : 713,548 |
| Kentucky | 1,858,635 | 5 | 1 : 571,727 |
| Louisiana | 1,118,587 | 2 | 1 : 559,293 |
| Maine | 661,086 | 1 | 1 : 661,086 |
| Maryland | 1,042,390 | 6 | 1 : 173,732 |
| Massachusetts | 2,238,943 | 4 | 1 : 559,736 |
| Michigan | 2,093,889 | 4 | 1 : 523,472 |
| Minnesota | 1,301,826 | 3 | 1 : 433,942 |
| Mississippi | 1,289,600 | ... | ..... |
| Missouri | 2,679,184 | 13 | 1 : 206,091 |
| Montana | 132,159 | ... | ..... |
| Nebraska | 1,058,910 | 1 | 1 : 1,058,910 |
| Nevada | 45,761 | ... | ..... |
| New Hampshire | 376,530 | 1 | 1 : 376,530 |
| New Jersey | 1,444,933 | ... | ..... |
| New York | 5,997,853 | 14 | 1 : 428,418 |
| Ohio | 3,672,316 | 19 | 1 : 193,279 |
| Oregon | 313,767 | 2 | 1 : 156,883 |
| Pennsylvania | 5,258,014 | 6 | 1 : 876,335 |
| Rhode Island | 345,506 | ... | ..... |
| Tennessee | 1,767,518 | 7 | 1 : 252,503 |
| Texas | 2,235,525 | 1 | 1 : 2,235,525 |
| Vermont | 332,422 | 3 | 1 : 110,807 |
| Virginia | 1,655,980 | 2 | 1 : 827,990 |
| Washington | 349,390 | 1 | 1 : 349,390 |
| West Virginia | 762,794 | ... | ..... |
| Wisconsin | 1,686,880 | ... | ..... |
| | 61,482,683 | 139 | 1 : 442,322 |

TABLE III.

Number of Medical Colleges in each State.—Several here put down are undoubtedly fraudulent, and several claiming to be regular are not so (1889).

| STATE. | Regular. | Homeopathic. | Eclectic. | Miscellaneous. |
|---------------------------------|----------|--------------|-----------|----------------|
| Alabama | 1 | ... | ... | ... |
| Arkansas | 1 | ... | ... | ... |
| California | 3 | 1 | 1 | ... |
| Carolina, North | 1 | ... | ... | ... |
| Carolina, South | 1 | ... | ... | ... |
| Colorado | 3 | ... | ... | ... |
| Columbia, District of | 4 | ... | ... | ... |
| Connecticut | 1 | ... | ... | ... |
| Georgia | 4 | ... | 1 | ... |
| Illinois | 5 | 2 | 1 | 1 |
| Indiana | 3 | ... | 1 | 2 |
| Iowa | 3 | 1 | 1 | ... |
| Kansas | 2 | ... | ... | ... |
| Kentucky | 5 | ... | ... | ... |
| Louisiana | 2 | ... | ... | ... |
| Maine | 1 | ... | ... | ... |
| Maryland | 6 | ... | ... | ... |
| Massachusetts | 3 | 1 | ... | ... |
| Michigan | 3 | 1 | ... | ... |
| Minnesota | 2 | 1 | ... | ... |
| Missouri | 9 | 2 | 1 | 1 |
| Nebraska | 1 | ... | ... | ... |
| New Hampshire | 1 | ... | ... | ... |
| New Jersey | 1 | ... | ... | ... |
| New York | 9 | 2 | 1 | 2 |
| Ohio | 10 | 2 | 2 | 5 |
| Oregon | 2 | ... | ... | ... |
| Pennsylvania | 5 | 1 | ... | ... |
| Tennessee | 6 | ... | ... | 1 |
| Texas | 1 | ... | ... | .. |
| Vermont | 1 | ... | ... | 2 |
| Virginia | 2 | ... | ... | ... |
| Washington | ... | ... | ... | 1 |
| | 102 | 14 | 9 | 15 |

Total 140

TABLE IV.

Table showing the Date of Organization of the Medical Schools at present existing (1889).

| DATE. | Regular. | Homoeopathic. | Eclectic. | Miscellaneous. | DATE. | Regular. | Homoeopathic. | Eclectic. | Miscellaneous. |
|----------------|----------|---------------|-----------|----------------|----------------|----------|---------------|-----------|----------------|
| | | | | | Forward . . . | 36 | 2 | 1 | 0 |
| 1765 | 1 | | | | 1858 | 1 | | | |
| 1782 | 1 | | | | 1859 | 3 | 2 | | |
| 1797 | 1 | | | | 1860 | | 1 | | |
| 1807 | 2 | | | | 1861 | 1 | | | |
| 1810 | 1 | | | | 1863 | 2 | 1 | | |
| 1819 | 1 | | | | 1864 | 2 | | | |
| 1820 | 1 | | | | 1865 | | | 1 | |
| 1821 | 1 | | | | 1867 | 1 | | | |
| 1823 | 1 | | | | 1868 | 1 | | 1 | |
| 1825 | 1 | | | | 1869 | 3 | | | |
| 1826 | 1 | | | | 1870 | 1 | | | |
| 1829 | 1 | | | | 1872 | 2 | 1 | 1 | 1 |
| 1832 | 1 | | | | 1873 | 1 | 1 | | |
| 1834 | 1 | | | | 1875 | 1 | 1 | | |
| 1837 | 1 | | | | 1876 | 1 | 1 | | |
| 1838 | 2 | | | | 1877 | | 1 | 1 | |
| 1840 | 1 | | | | 1878 | 1 | | | |
| 1841 | 2 | | | | 1879 | 4 | | 1 | |
| 1842 | 1 | | | | 1880 | 3 | | 1 | |
| 1843 | 1 | | | | 1881 | 5 | | | 1 |
| 1845 | 1 | | 1 | | 1882 | 6 | | | |
| 1846 | 1 | | | | 1883 | 7 | | 1 | 2 |
| 1847 | 1 | | | | 1884 | 2 | 1 | | |
| 1848 | | 1 | | | 1885 | 1 | | | 1 |
| 1849 | 1 | 1 | | | 1886 | 3 | | | |
| 1850 | 6 | | | | 1887 | 3 | | 1 | 1 |
| 1852 | 1 | | | | 1888 | 2 | 2 | | 1 |
| 1854 | 1 | | | | 1889 | 8 | | | 2 |
| 1855 | 1 | | | | | | | | |
| | 36 | 2 | 1 | 0 | | 101 | 14 | 9 | 9 |

Total, 133 (no data obtainable from some schools).

TABLE V.

*Date of Organization of all Medical Schools existing and extinct.**

| Date. | Number. | Date. | Number. | Date. | Number. | Date. | Number. | Date. | Number. |
|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|
| 1765 | 1 | 1825 | 1 | 1843 | 4 | 1860 | 1 | 1876 | 7 |
| 1782 | 1 | 1826 | 2 | 1844 | 1 | 1861 | 2 | 1877 | 3 |
| 1796 | 1 | 1827 | 2 | 1845 | 2 | 1862 | 1 | 1878 | 4 |
| 1797 | 1 | 1829 | 1 | 1846 | 2 | 1863 | 3 | 1879 | 6 |
| 1807 | 2 | 1831 | 1 | 1847 | 2 | 1864 | 2 | 1880 | 9 |
| 1810 | 1 | 1832 | 2 | 1848 | 8 | 1865 | 2 | 1881 | 11 |
| 1811 | 1 | 1833 | 1 | 1849 | 4 | 1866 | 1 | 1882 | 10 |
| 1812 | 1 | 1834 | 2 | 1850 | 8 | 1867 | 2 | 1883 | 16 |
| 1814 | 1 | 1835 | 1 | 1852 | 4 | 1868 | 4 | 1884 | 3 |
| 1817 | 1 | 1836 | 2 | 1853 | 3 | 1869 | 5 | 1885 | 5 |
| 1818 | 1 | 1837 | 1 | 1854 | 4 | 1870 | 6 | 1886 | 4 |
| 1819 | 1 | 1838 | 3 | 1855 | 3 | 1871 | 2 | 1887 | 6 |
| 1820 | 1 | 1839 | 4 | 1856 | 4 | 1872 | 7 | 1888 | 8 |
| 1821 | 1 | 1840 | 1 | 1857 | 1 | 1873 | 7 | 1889 | 10 |
| 1823 | 1 | 1841 | 2 | 1858 | 2 | 1874 | 3 | | |
| 1824 | 1 | 1842 | 1 | 1859 | 6 | 1875 | 2 | | |
| | 17 | | 27 | | 58 | | 50 | | 102 |

* Several of these schools existed only on paper. Some were fraudulent. Part of the increase of late years is due to the founding of medical departments in State Universities in the West. As many were founded in 1883 (16) as in the fifty-eight years between 1765-1823. Total, 254. (No data obtainable from some schools.)

TABLE VI.

Whole Number of Matriculates and Graduates in attendance in each State for the Years 1879-1880 and 1888-1889.

R. = Regular; H., Homœopathic; E., Eclectic; Mis., Miscellaneous; M., Matriculates; G., Graduates.

| STATES. | Schools. | Classes. | 1879-80. | 1888-89. |
|---------------------------------|--------------------|--|---|--|
| Alabama | R | { M G | 20 | 113 32 |
| Arkansas | R | { M G | 22 1 | 83 17 |
| California | { R H E | { M G M G M G | 42 18 48 13 | 268 62 18 10 39 8 |
| Carolina, North | R | { M G | ..... ..... | 42 7 |
| Carolina, South | R | { M G | 74 23 | 74 25 |
| Colorado | R | { M G | ..... ..... | 71 19 |
| Connecticut | R | { M G | 32 12 | 32 2 |
| Columbia, District of | R | { M G | 141 34 | 346 62 |
| Georgia | { R E | { M G M G | 165 51 | 298 129 40 19 |
| Illinois | { R H E M | { M G M G M G M G | 705 195 291 107 123 37 | 863 260 311 132 97 36 21 10 |

TABLE VI.—Continued.

| STATES. | Schools. | Classes. | 1879-80. | 1888-89. |
|-------------------------|---------------|----------|----------------|----------|
| Indiana | { R M E | { M | 249 | 107 |
| | | { G | 77 | 53 |
| | | { M | 15 | 36 |
| | | { G | 8 | 20 |
| | | { M G | ..... ..... | 21 8 |
| Iowa | { R H E | { M | 392 | 264 |
| | | { G | 139 | 85 |
| | | { M | 47 | 29 |
| | | { G | 9 | 9 |
| | | { M G | ..... ..... | 18 8 |
| Kentucky | R | { M | 604 | 973 |
| | | { G | 232 | 400 |
| Louisiana | R | { M | ..... | 269 |
| | | { G | ..... | 78 |
| Maine | R | { M | 105 | 71 |
| | | { G | 22 | 24 |
| Maryland | R | { M | 336 | 692 |
| | | { G | 110 | 217 |
| Massachusetts | { R H | { M | 263 | 332 |
| | | { G | 45 | 65 |
| | | { M | 127 | 94 |
| | | { G | 35 | 25 |
| Michigan | { R H | { M | 468 | 546 |
| | | { G | 118 | 135 |
| | | { M | 70 | 71 |
| | | { G | 18 | 21 |
| Minnesota | { R H | { M | ..... | 139 |
| | | { G | ..... | 10 |
| | | { M | ..... | 13 |
| | | { G | ..... | ..... |
| Missouri | { R H E | { M | 569 | 582 |
| | | { G | 192 | 157 |
| | | { M | ..... | 195 |
| | | { G | ..... | 69 |
| | | { M | 95 | 69 |
| | | { G | 42 | 31 |

TABLE VI.—*Continued.*

| STATES. | Schools. | Classes. | 1879-80. | 1888-89. |
|-------------------------|---------------|------------------------------|--|---------------------------------------|
| Nebraska | R | { M G | ..... ..... | 23 7 |
| New Hampshire | R | { M G | 78 29 | 67 20 |
| New York | { R H E | { M G M G M G | 2,142 629 157 40 172 32 | 2,318 638 159 42 75 12 |
| Ohio | { R H E | { M G M G M G | 910 310 130 47 243 50 | 898 300 168 48 245 79 |
| Oregon | R | { M G | 27 6 | 61 17 |
| Pennsylvania | { R H | { M G M G | 1,095 325 192 75 | 1,372 443 186 65 |
| Tennessee | R | { M G | 460 201 | 678 220 |
| Vermont | R | { M G | 143 53 | 187 59 |
| Virginia | R | { M G | 12 | 140 38 |

TABLE VI.—*Continued.*

| STATES. | Schools. | Classes. | 1879-80. | 1888-89. |
|------------------------|----------|----------|----------|----------|
| Totals* | R | { M | 9,022 | 11,909 |
| | | { G | 2,854 | 3,681 |
| | H | { M | 1,014 | 1,144 |
| | | { G | 331 | 425 |
| | E | { M | 681 | 604 |
| | | { G | 174 | 201 |
| | Mis. | { M | 50 | 57 |
| | | { G | 20 | 30 |
| Grand totals | | { M | 10,767 | 13,714 |
| | | { G | 3,379 | 4,337 |

* Totals include figures for some extinct schools not enumerated in the table.

TABLE VII.

Table showing Number of Schools having 50, 100, etc., Students :

There are 39 schools having less than 50 matriculates (1888-89).*

" " 28 " " " " 100 "

" " 28 " " " " 200 "

" " 12 " " " " 300 "

" " 2 " " " " 400 "

" " 3 " " " " 500 "

There is 1 school " " " 600 "

There are 2 schools " " " 700 "

Three thousand four hundred and thirty-one matriculates were in attendance at seven colleges. There were 13,714 students in attendance in medical schools in the year 1888-89, of whom 4337 graduated.

* From some schools data could not be obtained.

APPENDIX III.

THE following list gives the number of years of study required in American Medical Colleges.

Information could be obtained from the deans of only one hundred and eighteen schools. The minimum requirements are given in each case. Several institutions, while having a graded four-year course, state in their catalogues that students may, if able to pass the examinations, graduate in three years. The length of a college year varies from five to nine months.

| | Colleges. |
|--|-----------|
| Two years in medical school | 10 |
| Three years' study, two in medical school | 13 |
| Three years in medical school | 51 |
| Four years' study, three in medical school | 36 |
| Four years in medical school | 8 |
| Total | 118 |

The schools requiring a four-years' course are University of Pennsylvania, Harvard, University of Michigan, Northwestern University Medical School, Mehary Medical Department of Central Tennessee College, Woman's Medical College of Philadelphia, Harvard University, Johns Hopkins Hospital Medical School.

The following countries, of whose systems of medical education a sketch is given, are arranged alphabetically for convenience of reference, as was done in Appendix I., but they can be consulted in groups according to certain general resemblances in their systems. Thus, the German Empire, the Austro-Hungarian Empire, and Russia would form one such group, and Sweden and Norway another. France occupies a position peculiar to herself. England, Scotland, and Ireland are included under Great Britain. Italy and the Portuguese and Spanish-speaking countries form a final group, all the members of which possess a system of medical education essentially identical.

Argentine Republic: population, 4,086,492.—There are two universities (Cordoba and Buenos Ayres). The law gives them complete autonomy as far as their internal arrangements, such as plan and programme of study, examinations, and degrees, are concerned. To matriculate, the applicant must show a certificate as evidence that he has studied for six years in a national "college."

The medical course covers six years. There are annual examinations and three general examinations. The latter, however, may be taken together. A thesis is required. The professors receive salaries of about \$1680 yearly. Students pay a registration fee of from \$3 to \$4 for each study.

Austro-Hungarian Empire: population, 41,231,342.—Eight universities have faculties of medicine. Before beginning the study of medicine, the student must complete the course of a classical gymnasium. The medical course

is at least four years, and, in order to obtain the doctorate and authority to practice, it is necessary to pass three rigorous examinations (*Rigorosen*).

The first *Rigorosum* embraces physics, chemistry, anatomy, physiology, a practical examination upon the last two subjects, and a general theoretical examination upon all four.

The second *Rigorosum* embraces general pathology and therapeutics, pathological anatomy (pathological histology), pharmacology (pharmako-dynamics, toxicology, and prescription writing), and internal medicine (special pathology and therapeutics of internal disease), and also a practical examination upon pathological anatomy (upon preparations and the cadaver) and clinical, internal medicine (at the bedside), and then of a general theoretical examination upon all four subjects.

The third *Rigorosum* embraces surgery, special pathology, and therapeutics of external disease (*äusseren krankheiten*), diseases of the eye, obstetrics, and medical jurisprudence, and in addition a practical examination upon surgery (at the bedside and upon the cadaver), upon the eye (at the bedside), upon gynecology (at the bedside, upon the cadaver, or upon a manikin), and, finally, a general theoretical examination upon all four subjects.

The three "*Rigorosa*" must be stood at the same university, though in special cases the first may be held at another.

To be admitted to the *Rigorosa*, the candidate must have passed three different public examinations upon botany, zoölogy, and mineralogy; he must also show, in order to be admitted to the second, that he has attended medical and surgical clinics for at least four semesters, and eye and obstetrical clinics at least one semester. The government is represented on the commission that holds each *Rigorosum* by the government commissioner, and during the last one by a "co-examiner." The "*promotio*" takes place under the presidency of the rector. The salaries of the professors vary from 1800 to 4000 florins. They are permitted to give private courses. The students' fees are about \$250.

Brazil: population, 14,002,335.—There are two universities, Rio de Janeiro and Bahia. To matriculate, the applicant must have passed a preliminary examination in Latin, French, English, history, geography, philosophy, arithmetic, algebra to equations of the first degree, and geometry. The medical course covers six years, and is arranged as follows:

First Year.—Physics, chemistry, mineralogy, anatomy.

Second Year.—Botany, zoölogy, organic chemistry, physiology, anatomy.

Third Year.—Physiology, pathological anatomy, general pathology.

Fourth Year.—Medicine, surgery, obstetrics, and diseases of women and children.

Fifth Year.—Medicine, surgery, obstetrics, materia medica, and therapeutics.

Sixth Year.—Hygiene, history of medicine, medical jurisprudence, and pharmacy.

Ample clinical and practical instruction is given. Examinations are held at the end of each year upon the studies of the year. Upon passing the final examination, which embraces all the subjects of the course, and upon the presentation of a thesis, the candidate receives the degree of doctor of medicine, with the right to practice.

The professors and assistant professors are appointed by the government after examination. They receive fixed salaries, and have no pecuniary interest in the size of their classes.

Chili: population, 2,817,552.—There is a faculty of medicine in the university, and a school of medicine was established in 1889, under the direction of a university delegate. To matriculate, the applicant must have a diploma of a collegiate institute.

The course covers six years, and is as follows:

First Year.—Descriptive anatomy, inorganic chemistry, botany.

Second Year.—Descriptive anatomy, physiology, organic chemistry.

Third Year.—General pathology, medicine, surgery, pharmacy.

Fourth Year.—Medicine, surgery.

Fifth Year.—Medical and surgical clinics, practical classes, therapeutics and materia medica, hygiene.

Sixth Year.—General clinics, obstetrics, diseases of women and children, legal medicine and toxicology, mental diseases. After passing examination in the above subjects, the candidate receives the degree of doctor of medicine, with the right to practice. The professors' salaries are about \$1000 yearly.

Cuba.—There is one medical school,—the medical department of the University of Havana. It is under direct state control. The Governor-General of Cuba, as representative of the "minister of the colonies," is the chief of all educational establishments in the island. The university is governed directly by the rector, who is named from the professors *de termino* by the crown. He receives an extra salary of \$1500. The salaries of the professors vary from \$1500 to \$2500, and do not depend on the number of students. The professorships are filled by competitive examination, held alternately in Madrid and Havana. As preliminary to the study of medicine, the student is required to possess the degree of A.B. from a Spanish university. (The government does not recognize foreign degrees.) He must also take a preparatory course of a year, studying physics, chemistry, geology, botany, and mineralogy. The medical course is graded and extends over six years. The roster is as follows:

First Year.—Anatomy (first course, the bones, ligaments, muscles, and viscera), normal histology.

Second Year.—Anatomy (second course, vessels and nerves), practical anatomy (second course), physiology, private hygiene.

Third Year.—Materia medica and therapeutics, pathological anatomy, general pathology.

Fourth Year.—Medical pathology, surgical pathology, diseases of childhood, obstetrics and gynecology.

Fifth Year.—Clinical medicine, clinical surgery, clinical midwifery, topographical anatomy.

Sixth Year.—Clinical medicine, clinical surgery, public hygiene, legal medicine.

These are the branches required for the degree of licentiate in medicine, the only one most physicians possess. For the degree of doctor in medicine, which is necessary in order to be a candidate for a professorship, an extra year

of study is required, the following branches being studied: Public hygiene, critical history of medicine, biological chemistry, chemical analysis.

The term is officially nine months in each year, but the actual time of working is much lessened by holidays. Examinations are held in June and September, and no student is permitted to pass on to the studies of the next year until he has successfully passed the examinations of the year before. The examinations are all oral, and are conducted by a tribunal of three professors, one of whom must be the professor of the branch. At the end of the sixth year, in order to obtain the licentiate degree, the student must pass a general examination in all branches. He must examine a patient, diagnose the disease, and outline a plan of treatment. He must also perform an operation upon a cadaver. For the doctorate, the candidate must also prepare a thesis.

There has been established within the last few years a plan which allows a student on three different occasions in the year (May, September, and January) to come up for examination in any number of branches he pleases, provided he pays all the matriculation and examination fees beforehand and takes the examinations in their proper order. Should he fail in any of the lower branches, he forfeits all the fees of the higher ones. This form of examination is looked upon with great disfavor by the professors.

There are about two hundred and fifty medical students in the university. There is a matriculation fee of \$10 for each branch, the money going to the government, and an examination fee of \$5, one-half of which goes to the professors taking part in the examination. The graduation fees amount to about \$400 each for the licentiate and doctorate, the money going to the government.

France: population estimated at 38,343,139.—Seven faculties confer the degree of doctor, viz., Paris, Lisle, Montpellier, Lyons, Nancy, Bordeaux, and Toulouse. There are in addition a number of preparatory medical schools where a lower diploma, as of health officer, was given. This diploma has, however, been abolished by law of December 30, 1892. A health officer, after graduation, was assigned to practice in a certain district, but was not permitted to perform major surgical operations except under the supervision of a doctor. The great majority of students took the higher degree, and of course hereafter all will be required to do so. In 1891, there were twelve thousand four hundred and seven doctors and three thousand five hundred and twelve health officers; and in 1892, six hundred and thirty-five doctors of medicine, comprising surgery, were graduated as against thirty-nine health officers. There are two classes of the preparatory schools: the full schools, such as those of Algiers, Marseilles, and Nantes, and the preparatory schools of medicine and pharmacy, as those at Amiens, Angers, Biançon, Caen, Clermont, Dijon, Grenoble, Limoges, Poitiers, Rheims, Rennes, Rouen, and Tours. The requirements for admission to these preparatory schools were a diploma of bachelor in secondary classical studies and a certificate of studies in physics, chemistry, and natural sciences. The requirements for entrance to the full medical faculty are the same. The duration of medical study in France is now four and five years, from November 3 to July 31. The arrangements of the examinations are as follows: First examination, in the second half of the second year—*anatomy and dissection*; second examination, in the second half of the third year—*histology, phrenology, physics, and chemistry, applied to biology*; third examination, in the second half

of the fourth year—surgery, anatomy, pathology, midwifery, parasitical insects and plants, microbes; fourth examination, after fourth year—therapeutics, hygiene, legal medicine; fifth examination, after the fourth year—clinics, obstetrics. A thesis must be prepared on some subject chosen by the student. The course is frequently more than five years, as many applicants do not succeed in the examinations at the end of the required course.

German Empire: population, 49,428,470.—Twenty universities confer the academic degree of doctor. There are no preparatory medical schools. The staff of each university is made up of ordinary and extraordinary professors and "*docenten*." The professors alone have control of the administration of the affairs of the schools, which, though supported by the government, have an almost absolute autonomy. The "*docenten*" correspond closely to the instructors in American schools. The applicant for admission to a medical school must have passed the final examination in a gymnasium. The gymnasial course extends over nine years, though rarely a student may complete it in seven. The studies required are Latin, Greek, French, German, mathematics, including arithmetic, geometry, algebra, conic sections, trigonometry, and logarithms. History, ancient and modern. Geography, anatomy, botany, zoölogy, elementary mechanics, drawing, astronomy, chemistry, logic, and religious instruction. The average age at passing the final examination is eighteen or nineteen years. At Erlangen, a "proof of general culture of a corresponding grade" is accepted in lieu of the certificate of examination. At Königsberg, a "dispensation from the minister of education" may admit the student.

Generally speaking, the universities require four years' study before granting the degree of doctor of medicine. At Erlangen, however, the course is three years. The first two years are devoted to physics, chemistry, zoölogy, botany, mineralogy, anatomy, and physiology. Examination in these branches constitutes the so-called *tentamen physicum*. Two years later the candidate is examined upon the remaining subjects of the course. Passing a university examination does not confer licence to practice. The university makes the student a doctor, the state makes him a physician. Any one who chooses can practice, but he does so at his own peril, and if he makes any mistakes, he is punished by fine and imprisonment. Students who have passed a university but not the state examination can hold no appointment, and cannot compel the payment of fees. The state examination, the passing of which gives licence to practice, is divided as follows: 1. Anatomy, physiology, and pathological anatomy. 2. Surgery and ophthalmology. 3. Medicine proper. 4. Obstetrics and gynæcology. 5. General oral examination on the whole field. The examinations are both practical and theoretical. The results are classed as "excellent," "very good," "mediocre," "bad." If the student is classed as "bad" in one branch, or "mediocre" in two, he is held back for from three to ten months. The examining board is composed of professors from the different universities appointed annually by the ministry.

The university examination for the academic degree may precede or follow the state examination. Each professor examines in his own branch. The student must also prepare and successfully defend a Latin or German dissertation upon a medical subject.

The professors receive fixed salaries varying from \$800 to \$2400 annually, and increased every ten years by the addition of from \$100 to \$250. They also give private courses, for which they are paid by the students. The students' fees for the entire course vary in different schools from \$180 to \$260.

Great Britain: population, 37,740,285.—Eleven universities, an institution styled the "Examining Board in England by the Royal College of Physicians of London, and the Royal College of Surgeons of England," the Royal Colleges of Physicians and Surgeons of Glasgow, the Royal Colleges of Physicians and Surgeons in Ireland, the Society of Apothecaries in London, and Apothecaries' Hall in Ireland, grant degrees or diplomas of different grades. These institutions are not all teaching bodies some of them being merely boards of examiners with power to licence. Students are prepared for the examinations in institutions bearing the name of hospital or infirmary, sometimes that of medical college.

No person is allowed to be registered as a medical student unless he possesses a degree in art from some recognized collegiate institution, or has passed an examination, before some legally recognized body, in the following subjects of general education: 1. English language, including grammar and composition. 2. Latin, including grammar, translation from specified authors, and translation of easy passages not taken from such authors. 3. Elements of mathematics, comprising arithmetic, algebra, including simple equations, geometry, the first book of Euclid, and easy questions on subject matter of same. 4. Elementary mechanics of solids and fluids, comprising the elements of statics, dynamics, and hydrostatics. 5. One of the following optional subjects: any modern language, Greek, logic, botany, theology, elementary chemistry, zoölogy. This is, of course, the minimum requirement, and is passed by about one-half the total number of students. A large number pass a matriculation arts examination, and an increasing number possess the B.A. degree.

The course extends over five years, of about nine months each. The first four of the five years should be passed at a school or schools recognized by any of the licencing bodies, but the first year may be passed at a university or teaching institution recognized by any of the licencing bodies where physics, chemistry, and biology are taught. The fifth year should be devoted to clinical work at one or more public hospitals, or six months of the year may be passed as a pupil to a registered practitioner holding a public appointment, or possessing such opportunities of imparting practical knowledge as shall be satisfactory to the medical authorities.

The course of study comprises the following branches: 1. Physics, including the elementary mechanics of solids and fluids, and the rudiments of heat, light, and electricity. 2. Chemistry, including the principles of the science and the details which bear on the study of medicine. 3. Elementary biology. 4. Anatomy. 5. Physiology. 6. Materia medica and pharmacy. 7. Pathology. 8. Therapeutics. 9. Medicine, including medical anatomy and clinical medicine. 10. Surgery, including surgical anatomy and clinical surgery. 11. Midwifery, including diseases peculiar to women and to new-born children. 12. Theory and practice of vaccination. 13. *Forsensic medicine*. 14. Hygiene. 15. Mental disease. The "medical council" offers no opinion as to the manner in

which the subjects should be combined or distributed for purposes of teaching or of examination.

There are three examinations. Those in physics, chemistry, and biology should be passed before the beginning of the second winter session, and those in all other branches, except the finals in medicine, surgery, and midwifery, should be passed before the final year intended for clinical work. Examinations are written, oral, and practical. No examination should be held exclusively by the teachers of the student.

Upon passing the examinations, the candidate receives the right to practice with the title (differing in different schools) of licentiate, member, fellow, bachelor of medicine, bachelor of medicine and master of surgery, or doctor of medicine. The higher degrees have no privileges attached to them outside of the college granting them, except that they are requisite for appointment upon the staff of hospitals of any reputation.

The professors' salaries are derived entirely from the fees of the students, and thus depend directly upon the size of the classes.

Hayti: population, about 1,000,000. There is no preparatory medical school, but before entering on professional studies the student must take a high-school course. There is one school of medicine,—L'École de Médecine et de Pharmacie. It averages fifty to sixty students. There were seven graduates last year. The medical course extends over four years. There seems to be no system in its arrangement, it being divided to suit the convenience of the individual professors. It consists of natural history, chemistry, physics, anatomy, pathology, physiology, and surgery. The government pays all fees. The director receives \$120 per month. The professors receive \$80 per month. Each must give three hours a week service. The school being a government institution, its examinations are final. Graduates of other schools are required to pass an examination before a "medical jury" identical in *personnel* with the faculty of the medical school. There are fifty-five practitioners and forty health officers.

Italy: population, 30,347,291.—The following teaching institutions confer the degree of Doctor in Medicine and Surgery. The Universities of Turin, Genoa, Pavia, Padua, Bologna, Parma, Modena, Pisa, Sienna, Rome, Naples, Messina, Catania, Palermo, Cagliari, and Sassari, and the Royal Institute of Superior Studies of Florence. The University of Ferrara gives instruction in the first three years, and the Universities of Camerino and Perugia in the first four years of the medical course.

During the year 1892-93 there were six thousand five hundred and seventy-six students. During the year 1892, nine hundred and sixty-five received degrees.

There are no preparatory medical schools conferring a degree inferior to that of the doctorate. The medical schools have, however, a separate department giving special courses in midwifery. There is a school of hygiene, attended by physicians, which has for its object the special culture necessary for provincial doctors, and for other health officials who are charged with the care of the public health.

In order to be admitted to a medical school, the candidate must have graduated from a lyceum. The medical course extends over six years. There is no pre-established order of studies and examinations. The Council of Professors fix the course to which the student is to give the preference and follow each year, but students are at liberty to take the courses in the order which they may prefer, and the same is true as to examinations.

Professors in ordinary receive salaries from \$965 to \$1544 yearly; extraordinary professors, \$580 to \$675; and adjunct professors, \$241. They have no pecuniary interest in the size of their classes. They may, however, give free extra courses, for which they receive a fixed quota for each student. The students' fees for the entire course amount to \$172. There is no government examination subsequent to that conducted by the medical school conferring the degree.

Japan: population, 40,453,461.—The highest school in which medicine is taught is the College of Medicine of the Imperial University. At the end of last year there were one hundred and nine students in attendance. The officers of the college are as follows: a director, twenty professors, nine assistant professors, twenty-seven assistants, four unpaid assistants, eleven instructors, one emeritus professor, one director of the hospital. The graduates of the college are called *Igakushi* (Bachelors of Medicine and Surgery), and have the right to practice without undergoing a government examination. Thirty-one students were graduated last year. Before students are admitted to the first-year class they must either produce a certificate of having completed the regular course in one of the higher middle schools, or show, upon examination held at the university, the same degree of proficiency as those who have completed the courses of the above-named institutions, or of such other institutions as the Minister of State for Education shall have recognized as furnishing an equivalent course of instruction.

The course in medicine extends over four years, and is arranged as follows:

| FIRST YEAR. | Hours per Week. | | |
|--|-----------------|--------------|-------------|
| | First Term. | Second Term. | Third Term. |
| Anatomy | 6 | 6 | 6 |
| Anatomy (practical) | 6 | 12 | .. |
| Histology | 2 | 2 | .. |
| Histology (practical) | .. | .. | 7 |
| Physiology | 6 | 6 | 6 |
| General pathology | .. | .. | 5 |
| Pathological anatomy | .. | .. | 1 |
| General surgery | .. | .. | 2 |
| SECOND YEAR. | | | |
| Anatomy (practical) | 6 | .. | .. |
| (Viviparity) | .. | 2 | 2 |
| Topographical anatomy | 2 | 2 | .. |
| Pharmacology | 3 | 3 | 3 |
| Practical physiology (optional) | .. | .. | .. |
| Materia medica | .. | 2 | .. |
| Pharmacology anatomy | 5 | 5 | .. |
| Pathological histology (practical) | 2 | 2 | .. |
| Diagnosis | .. | 2 | 2 |
| General surgery | 2 | 2 | .. |

| SECOND YEAR.— <i>Continued.</i> | Hours per Week. | | |
|--|-----------------|--------------|-------------|
| | First Term. | Second Term. | Third Term. |
| Bandaging | .. | .. | 3 |
| Gynæcology | .. | .. | 6 |
| Ophthalmology | .. | .. | 2 |
| (Medical history) | 1 | 1 | 1 |
| Special medicine | 3 | 3 | 3 |
| Special surgery | 2 | 2 | 2 |
| THIRD YEAR. | | | |
| Topographical anatomy | 2 | 2 | .. |
| Special medicine | 3 | 3 | 3 |
| Clinical medicine | 4 | 4 | 4 |
| Out-patient dispensary (medical) | 6 | 6 | 6 |
| Special surgery | 1 | 2 | 3 |
| Clinical surgery | 6 | 6 | 6 |
| Out-patient dispensary (surgical) | 6 | 6 | 6 |
| Obstetrics | 5 | .. | .. |
| Practice on manikin | .. | 6 | .. |
| Ophthalmology | 1 | .. | 2 |
| Hygiene | .. | .. | 2 |
| Forensic medicine | .. | .. | 2 |
| FOURTH YEAR. | | | |
| Clinical medicine | 4 | 4 | 4 |
| Out-patient dispensary (medical) | 6 | 6 | 6 |
| Clinical surgery | 6 | 6 | 6 |
| Out-patient dispensary (surgical) | 4 | 4 | 4 |
| Demonstrations in surgery (practical) | .. | .. | 3 |
| Clinical gynæcology and obstetrics | 1 | 1 | 1 |
| Out-patient dispensary (gynæcology and obstetrics) | (6) | (6) | (6) |
| Ophthalmology | 1 | 1 | 1 |
| Out-patient dispensary (ophthalmology) | (6) | (6) | (6) |
| Dermatology and syphilis | 2 | 2 | 2 |
| Psychiatry | 2 | 2 | 1 |
| Hygiene | 2 | 2 | .. |
| Forensic medicine | 2 | 2 | .. |
| Clinical pædiatrics | 1 | 1 | 1 |
| Out-patient dispensary (pædiatrics) | (6) | (6) | (6) |

N.B.—The hours in parentheses show that the students are at liberty to choose any one of those subjects. Though required to attend some one of them, the students are not examined in them at the end of the year.

There are examinations at the end of each year and a final examination at the end of the course. The examiners are appointed from among the professors. The examinations are both theoretical and practical. In medicine and surgery, for instance, the candidate must examine one of the cases in the wards; give an opinion as to the etiology, diagnosis, prognosis, and treatment of the case; attend it in company with the examiners during six days, and describe in detail in a journal the patient's condition. He must also during the term of examination—six days—attend all the clinical lectures held by one of the examiners, and accompany him in his visits to the wards. During this time the examiner may call upon the candidate to examine any case. The examination in obstetrics and gynæcology is principally clinical.

The fees of the students amount to 25 yen (\$16.75) yearly. There are, however, quite a number of scholarships.

The salaries of the professors vary from 1000 to 3000 yen per annum, and are independent of the number of students.

There are seven Higher Middle schools in which medical instruction is given, and which have the right to grant licences to practice.

The students of all other schools not established by the government are required to pass an examination for licence to practice before a board composed of physicians of the imperial household, surgeons of the army and navy, professors of the Imperial University, and Higher Middle schools, and other specialists in dentistry, physics, and chemistry.

Finally, persons are granted a special licence to practice in a certain locality, even though unable to pass the examination, when it is shown that there are no regularly licenced physicians in that locality and that medical services are needed. There are fifty-two such in the whole country.

Mexico: population, 11,000,000.—There are seven medical schools, as follows: Mexico City, Campeachy, Guadalajara, Merida, Morelia, Oaxaca, San Louis Potosi.

Before beginning the study of medicine, the applicant must give evidence of a knowledge of mathematics, natural philosophy, chemistry, zoölogy, botany, logic, French, English, Latin, Greek roots, geography, literature, and history.

The course extends over five years, and includes instruction in anatomy, histology, pharmacy, physiology, internal and external pathology, therapeutics, general pathology, hygiene and medical meteorology, legal medicine, and theoretical and clinical obstetrics.

The schools examine and the government grants the right to practice.

The salaries of professors are fixed. There are no students' fees.

Netherlands, The: population, 4,621,744.—There are state universities at Leyden, Utrecht, Groningen, and a Communal University at Amsterdam. There are athenæums at Amsterdam, Deventer, and Maastricht, the students attending which must be examined for degrees at one of the universities. During the last year there were one thousand four hundred and fifty-five students, of whom twenty-five graduated. To matriculate, the student must present a certificate from a gymnasium, or undergo an equivalent examination. The duration of the medical course depends upon the student himself. The average time is seven years. There are two examinations, the "*Candidaats*" and the "*Doctoraal*." The degree conferred by a university does not give the right to practice. In order to be permitted to practice, it is necessary to pass an examination held by a board appointed by the crown. The professors' salaries range from \$1608 to \$2412 annually. The students' fees amount to \$80 per annum for the first four years, \$20 for examination, and \$10 for the examination granting the right to practice. The professors have no pecuniary interest in the size of their classes.

Norway: population, 1,988,771.—The only medical school is connected with the University of Christiania. Before beginning the study of medicine, the applicant must pass two examinations,—one in arts, including Norwegian, Latin, Greek, French, German, English, mathematics, geography, and history; and one in philosophy, including geometry, geology, botany, astronomy, and

the elements of chemistry and physics. The medical course occupies from six to eight years, and leads not to the doctorate but simply to the title of physician.

The following examinations are held during the course :

1. Two and a half years after matriculation, upon anatomy, dissection, use of the microscope, histology, chemistry (organic and inorganic), geology, and botany.

2. Three and one-half years later, upon physics, pharmacology, toxicology, medicine, therapeutics, general pathology and pathological anatomy, surgery, ophthalmology, dermatology, and syphilis.

3. One year later, upon surgery and bandaging, topographical anatomy, obstetrics and gynaecology, diseases of children, forensic medicine, hygiene, and a practical examination in medicine and surgery. Thorough practical work in the hospital is also obligatory. The examinations are held by the faculty. The doctorate is a scientific degree, giving the right to lecture at the university, and obtainable only by passing a very severe examination. The fees for the doctorate are high, and in consequence the candidates few in number. Women are admitted to the university on the same standing as men. The professors receive salaries beginning at \$1000 and increasing to \$1900, the remuneration of each professor depending upon the length of time he has occupied the chair. Graduates pay no fees.

Portugal: population, 4,708,178 (in 1881).—There are three medical schools (Coimbra, Oporto, and Lisbon), all supported by the government. There is a preparatory medical course given in the Polytechnic Academy of Oporto. The University of Coimbra, in its three years' preparatory medical course, instructs in: 1. Higher algebra, analytical geometry, trigonometry, and inorganic chemistry. 2. Organic and analytical chemistry and physics. 3. Botany, physics, and zoölogy. The medical course covers five years, and is as follows:

First Year.—Human and comparative anatomy, histology, and general physiology.

Second Year.—Physiology, hygiene, topographical anatomy, medicine, pathological anatomy, and toxicology.

Third Year.—Materia medica and pharmacy, general pathology, history of medicine, surgical pathology, and dermatology.

Fourth Year.—Internal pathology, toxicology and midwifery, and clinical surgery.

Fifth Year.—Clinical work, legal medicine, public and police hygiene.

After passing the final examinations, the candidate is licenced to practice. To receive the doctorate, a thesis must be presented.

Russia: population, 115,226,542.—There are eight medical schools,—viz., the Universities of Dorpat, Helsingfors, Moscow, Warsaw, Kieff, Charkow, Kazan, and the Medico-Chirurgical Academy of St. Petersburg, the last being under the jurisdiction of the War Department.

The matriculate must have a certificate from a gymnasium and be at least seventeen years old. The medical course extends over five years, and is similar to that in Germany. There are examinations at the end of each year. Students may go from one university to another, and so finish their studies where they

wish. The final examination is passed before a committee appointed by the Minister of Education, and consisting of the professors of the faculty, other professors and well-known learned men, the rector of the university, and the Minister of Public Instruction. Passing this, the student is qualified to practice under the title of "Physician." To obtain the title of "Doctor," he must, after a period of further study varying from six months to two years, pass another examination and present a thesis.

Students pay for tuition about \$40 yearly. The professors receive a salary of \$2400.

Spain: population, 17,550,246.—There are faculties of medicine in nine of the ten universities. In order to matriculate, it is necessary to be a bachelor of arts, and to have studied in the faculty of exact, physical, and natural sciences. A four years' course leads to the degree of bachelor, two years more to the licentiate, the doctorate being still more advanced. The University of Madrid alone confers the doctorate.

The course is as follows:

First Year.—Descriptive anatomy, microscopy, dissection, physics, chemistry.

Second Year.—Physiology, general pathology and pathological anatomy, dissections, public and private hygiene, geology.

Third Year.—Therapeutics and pharmacology, surgical pathology, clinical surgery.

Fourth Year.—Medical pathology, clinical study, obstetrics, diseases of women and children, legal medicine and toxicology.

Fifth Year.—General pathology, pathological anatomy, experimental physiology, clinical medicine, and surgery.

Sixth Year.—Still more extended work in therapeutics and pharmacology, medical hydrology, legal medicine and toxicology, embryology, obstetric clinics, diseases of women and children, medical clinics. For the doctorate, the student must pass higher examinations in general anatomy, public hygiene, epidemiology, medical history, and medical chemical analysis.

The licentiate confers the right to practice. The professors receive fixed salaries.

Sweden: population, 4,802,751.—There are two universities (Lund and Upsala) and one academy (Stockholm). Before beginning the study of medicine, the student must pass a graduation examination from a gymnasium or from one of the designated private lyceums. This examination is both oral and written, and is controlled by persons appointed from the universities by the minister of public instruction and ecclesiastical affairs or by the king. The usual time spent in medical studies is ten years. At the end of three years there is an examination in physics, chemistry, mathematics, botany, geology, and comparative anatomy; three years later, in anatomy, physiology, physiological chemistry, general pathology, pathological anatomy, and pharmacology. Four years later, in practical medicine and surgery, obstetrics, ophthalmology, and medical jurisprudence. Upon passing these examinations the candidate receives the right to practice. Attendance upon lectures is not obligatory, but the student must attend clinics for six months in Lund or Upsala, and must go

to Stockholm, where he must attend the medical and surgical clinics for eight months, the obstetrical clinics for four months, and the psychiatric clinics for two months. The degree of "Doctor of Medicine" is conferred only by the universities. To obtain it the candidate must be a licentiate, and must present a thesis subject to debate. Women are admitted on equal terms with men. The professors receive a fixed salary of from \$1120 to \$1400. Students pay no fees. Nowhere is the standing of the medical profession higher than in Sweden.

Switzerland: population, 2,917,754.—The following institutions teach and grant the degree of doctor: The medical faculties in Basel, Zurich, Bern, Lausanne, and Geneva. There were in the winter semester of 1892-93, 635 students. During the year 1892, 94 students received the academic degree of doctor, and 83 the diploma from the government admitting to practice.

Before beginning to study medicine, the applicant must prove that he has passed through the course of a gymnasium or its equivalent.

The course extends over at least ten semesters,—five years. The arrangement of studies is legally left largely to the wishes of the student. The authorities of the universities, however, recommend special rosters to the students. The line of study is quite similar to that in Germany. In order to be permitted to practice, the student must pass examinations in the natural sciences and in the subjects of professional study. The examinations are both theoretical and practical.

The students' fees amount to about \$500 for the ten semesters. The salaries of professors range from \$800 to \$1300 yearly. They have a pecuniary interest in the size of their classes, since they receive a greater or less percentage of the students' fees.

Uruguay: population, 676,955.—There is one university. To matriculate, the applicant must have the baccalaureate degree in science and letters.

The course covers six years, and is as follows:

First Year.—Physics and chemistry, pharmacy, anatomy, dissection.

Second Year.—Natural history, biological chemistry, anatomy, dissection.

Third Year.—Physiology, pathological anatomy, general pathology, clinical semeiology.

Fourth Year.—Medical pathology, surgical pathology, therapeutics, medical and surgical clinics.

Fifth Year.—Medical and surgical pathology, obstetrics and gynecology, hygiene, medical, surgical, obstetrical, and gynecological clinics.

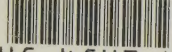
Sixth Year.—Topographical anatomy and operations, legal medicine, ophthalmology, clinics.

The diplomas must be countersigned by the minister in charge of education.

Venezuela: population, 2,328,527.—The following institutions confer the degree of doctor: The Central University of Venezuela, at Caracas; the University of Los Andes, at Merida; the University of Zulia, at Maracaibo; the University of Valencia; and the federal colleges of the first category of the states of Bolivar, Bermudez, Lara, Miranda; of Los Andes, in Trujillo, and of Falcon, in Coro. Last year the Central University conferred fourteen degrees,

Los Andes nine, and Zulia six. The others conferred no degrees. There are at present two hundred and ninety-four medical students at the Central University, one hundred and twelve at Los Andes, sixty-four at Valencia, thirty-six at the Federal College of Bermudez, seventeen at Miranda, eighteen at Bolívar, and eight at Falcon. There are no preparatory medical schools. "Health officers" are students who practice in the hospitals. There are twelve hundred and forty-eight physicians in the Republic. In order to be admitted as a student in the medical course, it is necessary to possess the diploma of Bachelor of Philosophical Sciences. The medical course extends over six years. There are annual examinations. Students' fees amount to about \$20. The professors receive about \$800, and have no financial interest in the size of their classes. The right to practice is granted by the institution conferring the degree, and not by the government.

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